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MONOGRAPH OF TETRAMERIUM AND HENRYA[1]

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INTRODUCTION

Two closely related but different generic units, described first by Nees von Esenbeck as *Tetramerium* and *Henrya,* have long been the occasion for discussion among taxonomists. While over a period of years further studies in the field and of herbarium material have advanced the understanding of these plants, yet the published results in combining and separating the two genera have demonstrated that a more critical comparative morphological study was necessary to reevaluate the two entities represented and to eliminate if possible further confusion concerning them. Consequently studies of herbarium material in the Henry Shaw School of Botany, supplemented by material generously loaned from many herbaria in this country and Europe and of living specimens grown from seed in the Missouri Botanical Garden, have been made during the past four years. The following paper embodies the results of these studies together with some historical, morphological, and phylogentic factors, as well as the geographical distribution of the genera and species under consideration.

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[1] An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

Issued November 23, 1937.

TAXONOMIC HISTORY

Tetramerium and *Henrya* are generic names which were proposed by Nees von Esenbeck to designate two genera of the natural family Acanthaceae. Complete descriptions and careful illustrations of them were published in Bentham's[1] 'Botany of the Voyage of the Sulphur' in 1844. In this work, this distinguished student of the Acanthaceae characterized four species, namely *Tetramerium nervosum* and *T. polystachyum, Henrya insularis* and *H. Barclayana.* Two more species, *Tetramerium hispidum* and *Henrya scorpioides,* were subsequently described by the same author.[2] Since these last two species were published in 1847, further contributions to the knowledge of both genera have appeared in literature, such as *T. glandulosum, T. ovalifolium,* and *T. ovatum* Oersted in 1854, *T. platystegium* Torrey in 1859, *H. costata* A. Gray in 1886, *T. glutinosum* Lindau in 1894, *H. imbricans* J. Donnell Smith in 1891, *T. aureum, T. diffusum,* and *T. tenuissimum* Rose in 1895, *H. grandifolia* Fernald in 1895, *H. costata* A. Gray var. *glandulosa* Brandegee in 1903, *T. gualanense* Robinson & Bartlett in 1907, *T. flavum* Eastwood in 1909, and *T. nemorum* and *T. geniculatum* Brandegee in 1913.

At the beginning of the author's studies in 1933, there were twenty-five published species and varieties which had been referred either to one or the other of these two genera. After careful examination of the morphological and other characteristics of these plants, with extensive consideration of the taxonomic importance of each character, it is felt that the recognition of *Tetramerium* and *Henrya* as two related but morphologically distinct genera, as defined by Nees von Esenbeck, clarifies the previously confused condition of this group. The present treatment recognizes twenty-five species and varieties in *Tetramerium* and twenty-one species and varieties in *Henrya.*

ACKNOWLEDGMENTS

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[1] Nees in Benth. Bot. Voy. Sulphur, p. 147, *pl. 48.* 1844.

[2] Nees in DC. Prodr. **11**: 467. 1847.

Washington University, the author wishes to express his appreciation to Dr. G. T. Moore, Director. Appreciation is also extended to the other members of the faculty for their helpful suggestions in their special fields of study. To Miss N. Horner, Librarian, and other members of the library staff, thanks are expressed for aid in compiling the bibliographic material. Sincere gratitude is extended to Dr. J. M. Greenman, Curator of the Herbarium, under whose immediate direction this work has been done, for his generous and wise guidance and assistance.

The cooperation of the curators of several herbaria, some of which are listed below, in permitting loans of specimens under their care has greatly facilitated this work; the author is appreciative of their generous assistance. The institutions which have loaned material for this study and whose specimens are cited in this paper are the following:

B = Herbarium of the Berlin Botanical Garden and Museum.
CalAcad = Herbarium of the California Academy of Sciences.
Cop = Herbarium of the University of Copenhagen.
Cornell = Herbarium of Cornell University.
D = Dudley Herbarium of Leland Stanford, Jr. University.
F = Herbarium of the Field Museum of Natural History.
G = Gray Herbarium of Harvard University.
K = Herbarium of the Royal Botanic Gardens, Kew.
M = Herbarium of the Missouri Botanical Garden.
NY = Herbarium of the New York Botanical Garden.
P = Herbarium of Pomona College.
PhilAcad = Herbarium of the Academy of Natural Sciences, Philadelphia.
Pitt = Herbarium of Carnegie Museum, Pittsburgh.
Stock = Herbarium of the University of Stockholm.
UAriz = Herbarium of the University of Arizona.
UCal = Herbarium of the University of California.
UMich = Herbarium of the University of Michigan.
US = United States National Herbarium.
UTex = Herbarium of the University of Texas.
Utrecht = Herbarium of the University of Utrecht.

TETRAMERIUM

GENERAL MORPHOLOGY

Roots.—The fibrous root system is not extensive, sometimes branching from a slender primary root and producing varying modifications in accordance with the habitat. The roots are perennial and maintain themselves usually from year to year, the new shoots borne near the base of the old ones. Roots also appear frequently in certain species at the nodes of the subprostrate stems. Taxonomically, they present characters of rather infrequent value.

Stems.—The stems are mostly slender and freely branched, the branches opposite. Usually they are more or less terete, but sometimes become somewhat quadrangular in cross-section with rather rounded angles. The branches are more or less herbaceous and die back towards the ground during unfavorable growing seasons; new shoots develop during more advantageous periods of growth. The lower forms are commonly decumbent-prostrate, ascending, or loosely ascending-spreading. The pubescence is at first usually evenly distributed; later it frequently occurs in lines on alternating sides between the nodes, and finally the stem and branches on the exfoliation of the bark become glabrous.

Leaves.—In shape and size the leaves vary considerably on the same plant. The primary leaves, when present, are usually the larger but fall comparatively early. In some cases their shape remains constant in all stages, but in others, the variations are so extensive as to have no practical taxonomic value. Their margins are always entire. They tend rather frequently to be strongly veined underneath and have petioles of varying lengths, although they are sessile in one species. In all cases the leaves are opposite. Their surface is often more or less pubescent, usually more so on the upper surface and more conspicuously so on the midrib and nerves.

Bracts.—The bracts vary greatly and present probably one of the best taxonomic criteria due to their conspicuous appearance and persistence over a considerable period of time. They vary in shape from the broad rotund-ovate type, as in *T. nervosum,* to the linear type, as in *T. aureum* and *T. diffusum.* The apex is usually mucronulate or occasionally mucronate. Often the lower bracts are foliaceous, simulating the younger leaves. On the outer surface are found conditions ranging from a close even pubescence as in *T. Standleyi,* scattered pubescence as in *T. hispidum,* to a glabrate condition as shown in

T. leptocaule and *T. fruticosum*. When present, the pubescence is usually more conspicuous on the midrib and nerves. The bracts are also more or less ciliate. The bracteoles are present in a majority of the species. In most cases, as in *T. polystachyum,* there are usually two lanceolate-linear or filiform bracteoles. A few species, as *T. hispidum,* have also two or sometimes three shorter secondary bracteoles present in many cases, but not uniformly throughout the species.

Pubescence.—The trichomes are found to be both unicellular and multicellular and vary considerably in abundance, length, rigidity, thickness, and glandulosity. In general, the early stages of the plant exhibit a more closely pubescent condition than the later ones although in some instances, as *T. glutinosum,* the closely appressed lanate hairs vary but little through the periods of growth. Although the length of hairs varies to some extent in accordance with the development of the plant, constant lengths within specific limits are maintained; for example, *T. nervosum* exhibits rather long trichomes, *T. sessilifolium* and *T. Langlassei* those of intermediate length, and *T. polystachyum* and *T. leptocaule* minute hairs that are barely distinguishable. The degree of pubescence also ranges considerably from that which is pilose in *T. Standleyi* and lanate in *T. glutinosum,* hirsute in *T. hispidum,* to stiffly hirsute in *T. aureum* and *T. Hintonii.* Considerable variation in thickness also occurs. The glandular hairs vary from a minutely globular-tipped hair to a relatively broad and flat-tipped hair. In some forms there are intermixtures of long and short, erect, recurved, or subappressed non-glandular and glandular hairs. Such a condition is shown in *T. macrostachyum.*

Inflorescence.—The inflorescence is always more or less spicate and terminal or lateral in position. Commonly, the spike has closely imbricated bracts, caused in part by the short internodes. Occasionally, as in *T. diffusum,* the longer internodes completely eliminate the imbrication of the floral bracts. The strongly decussating position of the floral bracts gives the inflorescence a conspicuous four-angled appearance, a character which is relatively constant throughout the genus.

Calyx.—The calyx is four- to five-lobed, the lobes filiform to lanceolate, diminutive and quite inconspicuous. The lobes usually bear on the outer surface in a lesser degree pubescence of the general type of the bract.

Corolla.—The corolla is tubular-infundibuliform and bilabiate. The tube is about half the length of the entire corolla and slightly expanded at the base. The anterior lip is three-lobed, the lobes varying from lanceolate to broadly ovate, and the middle lobe is more or less concave, usually enclosing in part the stamens and pistil. The posterior lip is lanceolate to broadly ovate, tending to broadness towards the apex, and entire to conspicuously emarginate at the apex. The surface is mostly glabrous but scattered hairs occur occasionally and in *T. platystegium* form an even pubescence, particularly on the outer surface. The buds are imbricated in aestivation.

Stamens.—There are two mostly terete filaments inserted at the base and near the margin of the middle lobe of the anterior lip, or, as in one species in Section II, near the margins of the lateral lobes of the anterior lip. On the filament near the base, a few scattered reflexed hairs are frequently present. Each filament bears two nearly parallel sporangia. The stamens are included and usually slightly shorter than the corolla. The pollen is ellipsoid to spherical.

Fruit.—The fruit consists of an obovate-oblong capsule constricted from the base to about one-third its total length. The seeds are borne on retinacula, usually four, rarely two, disciform, muriculate on one surface and glabrous on the other.

GEOGRAPHICAL DISTRIBUTION AND INTERSPECIFIC RELATIONSHIPS

The genus *Tetramerium* as delimited in the present paper includes twenty-three species and two varieties. Its general geographical distribution extends from southern United States, southeast to Colombia and Ecuador. One species, *T. nervosum,* occurs in the Galapagos Islands where it was possibly introduced. Considering the extent of this range and the relative abundance of species and individuals, the center of distribution of this genus falls in west-central Mexico. These plants for the most part grow in rather dry, more or less xerophytic situations at relatively low altitudes and are consequently limited largely to such habitat zones.

In the following chart, an attempt is made to indicate interspecific relationships within the genus.

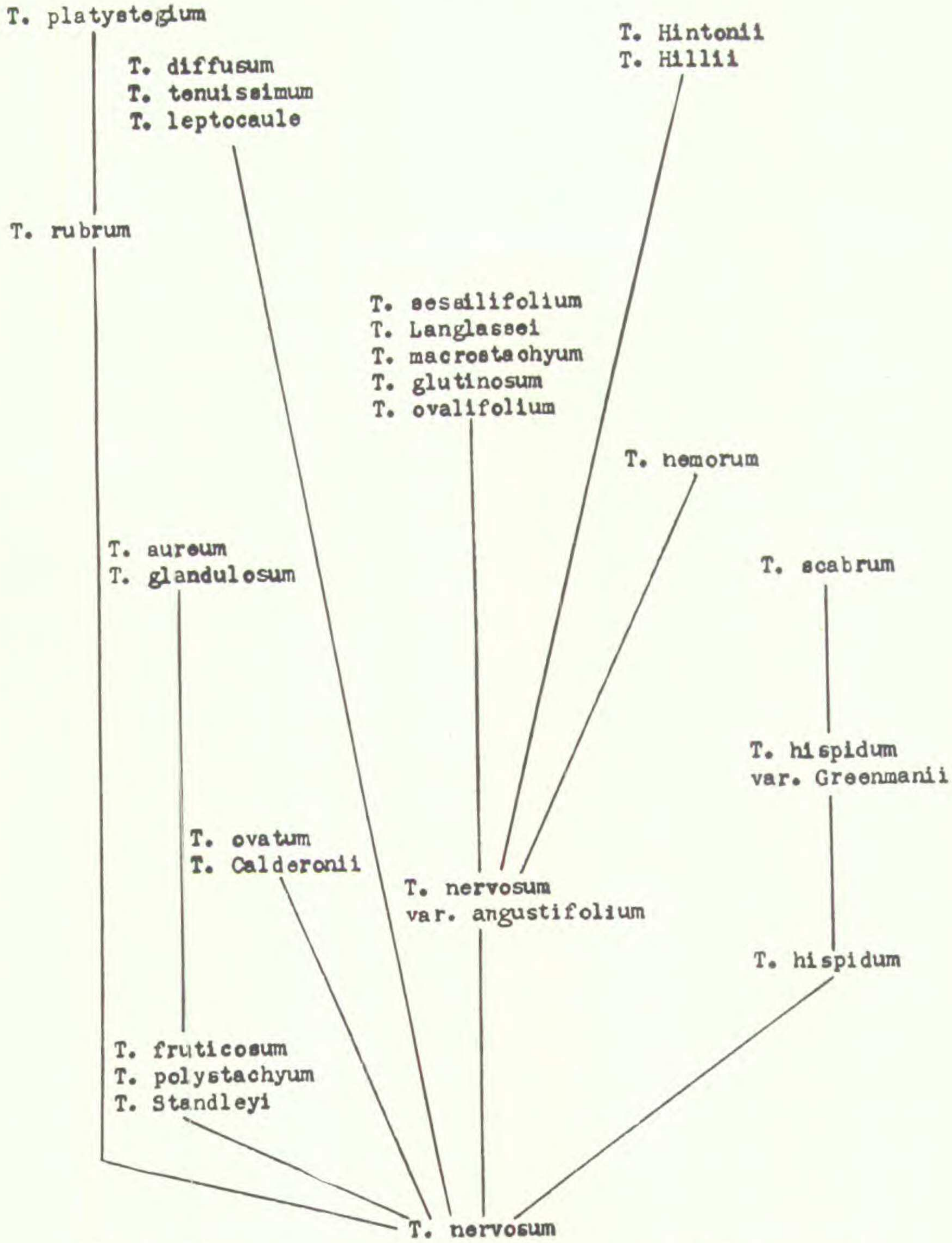

Fig. 1. Diagram to show interspecific relationships of *Tetramerium*.

TAXONOMY

Tetramerium Nees in Benth. Bot. Voy. Sulphur, p. 147. 1844; Nees in DC. Prodr. **11**: 467. 1847; Benth. & Hook Gen. Pl. **2**: 1121. 1876, in part; A. Gray, Syn. Fl. N. Amer. **2**^{1}: 330. 1878; Hemsley, Biol. Cent.-Am. Bot. **2**: 525. 1882, in part; Lindau in Engler & Prantl, Nat. Pflanzenfam. IV, Abt. 3b, p. 331. 1895, in part, not *Tetramerium* Gaertn. f. Fruct. et Sem. **3**: 90. *pl. 196.* 1805.

Fruticose or suffruticose perennials. Roots fibrous. Stems erect to spreading-decumbent, occasionally 4-angled in cross-section, smooth, whitish, bearing exfoliating bark; branches opposite, shoots of the season arising from a ligneous base, pubescence distributed over the surface or disposed in two opposite lateral lines. Leaves opposite, sessile or petiolate, entire, rotund-ovate to linear, both surfaces pubescent to glabrous. Inflorescence terminal and axillary, spicate, more or less imbricated. Bracts single, herbaceous, opposite, entire, sessile to short-petiolate, loose or imbricated, cordate to linear, 3–5-nerved, pubescent to glabrous, ciliate, apex more or less mucronate, erect or recurved. Bracteoles 1 to several, herbaceous, sessile to short-petiolate, filiform to ovate-acuminate, pubescent to glabrous, ciliate. Inflorescence a 4-angled terminal or axillary spike. Flowers usually solitary, occasionally 2 or 3, sessile or short-pedicellate, subtended by bracts and bracteoles. Calyx 4–5-parted, cleft nearly to the base, lobes usually equal, filiform to ovate-acuminate, pubescent to glabrate, ciliate. Corolla tubular-infundibuliform, bilabiate, anterior lip 3-lobed, lip and all lobes oblanceolate to oblong, nearly equal, tube straight or slightly curved, one-half to two-thirds length of corolla, expanding slightly at base, abruptly dilating in throat. Stamens 2, inserted in the corolla-throat, wholly included; filaments long, cylindrical, gradually enlarging near the base, lower portion loosely and retrorsely hispidulous; anthers consisting of two uniformly fertile, oblong-obtuse sporangia somewhat converging towards the apex, one slightly longer at base, borne on a rather broad connective; pollen ellipsoid to spherical, pores 3, equatorial, 20 to 50 μ in diameter, surface minutely scrobiculate. Ovary biloculate, retinacula acuminate, ovules usually 4, rarely 2, stylar shaft surmounted by bifid stigma, base thickened, apex obtuse. Capsule obovate, apiculate, contracted below into a solid base, usually hispid, rarely glabrous towards the apex, dehiscing from the apex; seeds usually 4, rarely 2, surface tuberculate or muriculate.

Type species: *Tetramerium nervosum* Nees in Benth. Bot. Voy. Sulphur, p. 148, *pl. 48.* 1844.

KEY TO THE SECTIONS

A. Tube equal to one-half length of corolla...Section I. EUTETRAMERIUM. Spp. 1–21
AA. Tube equal to two-thirds length of corolla..Section II. TORREYELLA. Spp. 22–23

Section I. EUTETRAMERIUM, n. sect. Leaves linear to cordate. Bracts linear to cordate. Calyx-lobes 4 or 5. Corolla-tube one-half the total length of corolla. Stamens inserted on middle lobe of anterior lip of corolla. Pollen-grains ellipsoid. Capsule terete. Seeds usually 4, infrequently 2, 1–2.2 × 0.8–2 mm. Species 1–21 incl.

KEY TO THE SPECIES

A. Bracts of the inflorescence rotund-ovate, ovate-oblong to ovate-elliptic.
  B. Bracts rotund-ovate to ovate, slightly longer than broad.
    C. Bracts pubescent or puberulent, usually without gland-tipped hairs intermixed.
      D. Bracts hirsute-pubescent on the surface.
        E. Leaves rather broadly ovate......................*1. T. nervosum*
        EE. Leaves mostly narrowly ovate to lanceolate..*1a. T. nervosum* var. *angustifolium*
      DD. Bracts hirsute-puberulent on the surface.
        F. Bracts strongly constricted at the base; calyx-lobes 5....*2. T. ovatum*
        FF. Bracts not strongly constricted at the base; calyx-lobes 4...*3. T. Standleyi*
    CC. Bracts glandular-pubescent or glandular-puberulent.
      G. Stems conspicuously hirsute; leaves distinctly glandular-pubescent..*4. T. Hillii*
      GG. Stems not conspicuously hirsute; leaves neither distinctly glandular nor pubescent..................................*5. T. leptocaule*
  BB. Bracts ovate-oblong to elliptic, usually much longer than broad.
    H. Bracts mostly ovate-oblong, not conspicuously ciliate....*6. T. fruticosum*

HH. Bracts mostly ovate-elliptic, usually conspicuously ciliate.

I. Leaves ovate-elliptic to lanceolate-elliptic; bracts closely pilose on the veins; calyx-lobes 5........................*7. T. ovalifolium*

II. Leaves ovate to lanceolate; bracts sparsely hirsute on the veins; calyx-lobes 4..................................*8. T. Calderonii*

AA. Bracts of the inflorescence ovate-lanceolate, obovate-lanceolate to linear.

J. Bracts ovate-lanceolate, obovate-lanceolate to lanceolate.

K. Bracts ovate-lanceolate to obovate-lanceolate, mostly abruptly acuminate near the apex, not gradually acuminate.

L. Bracts ovate-lanceolate...........................*17. T. hispidum*

LL. Bracts obovate-lanceolate.

M. Leaves not cordate........................*9. T. macrostachyum*

MM. Leaves cordate...............................*10. T. nemorum*

KK. Bracts lanceolate-ovate to linear, mostly cuneate to gradually acuminate near the apex.

N. Leaves usually sessile......................*11. T. sessilifolium*

NN. Leaves petiolate.

O. Bracts pubescent with gland-tipped hairs intermixed.

P. Pubescence of bracts flaccid-hirsute, with long gland-tipped hairs intermixed.

Q. Bracts sublanate, with glandular hairs intermixed..... ....*12. T. glutinosum*

QQ. Bracts not sublanate, pubescent with gland-tipped hairs intermixed.

R. Leaves sparsely hirsute-pubescent......*13. T. Langlassei*

RR. Leaves densely glandular-pubescent......*14. T. Hintonii*

PP. Pubescence of bracts glandular-hirtellous or hirtellous, with minute gland-tipped hairs intermixed.

S. Secondary leaves lanceolate-ovate to ovate; bracts glandular-hirtellous; calyx lobes 4............. ....*15. T. polystachyum*

SS. Secondary leaves elliptic-ovate to oblong-lanceolate; bracts hirtellous with minute gland-tipped hairs intermixed; calyx-lobes 5........*16. T. tenuissimum*

OO. Bracts hirsute-pubescent, usually without gland-tipped hairs intermixed..............................*17. T. hispidum*

JJ. Bracts lanceolate-oblong, oblanceolate-linear to linear.

T. Bracts lanceolate-oblong, hirsute-pubescent with short gland-tipped hairs intermixed.

U. Bracts strongly recurved.............*17a. T. hispidum* var. *Greenmanii*

UU. Bracts erect.......................................*18. T. scabrum*

TT. Bracts lanceolate-linear, oblanceolate-linear to linear, mostly conspicuously glandular-pubescent or merely glandular-hirtellous.

V. Stems not copiously branched near the base; branches stout; bracts of the inflorescence crowded.

W. Leaves cuneate to subcordate at the base; petioles not densely glandular-puberulent ....*19. T. glandulosum*

WW. Leaves cuneate to rounded at the base; petioles densely glandular-pubescent..*20. T. aureum*

VV. Stems much-branched near the base; branches slender; bracts of the inflorescence remote................................*21. T. diffusum*

1. T. nervosum Nees in Benth. Bot. Voy. Sulphur, p. 148, *pl. 48.* 1844; DC. Prodr. **11**: 468. 1847; Seem. Bot. Voy. Herald, p. 325. 1856; Torr. in Bot. U. S. & Mex. Bound. Surv. **2**: 125. 1859; Hemsl. Biol. Cent.-Am. Bot. **2**: 526. 1882; Rob. Proc. Amer. Acad. **38**: 204, 234. 1902, as *T. hispidum.*

Pls. 27, 31–33.

Stem branched, branches spreading, slender, at first evenly pubescent, later pubescent in lines, or glabrous; leaves ovate, 1.5–3.5 cm. long, 1–3 cm. broad, acuminate, acute, subcordate to obtuse at the base, sparsely pubescent on both surfaces, more conspicuously so on the midrib and nerves; petiole 0.5–2 cm. long, pubescent to glabrous; inflorescence a closely imbricated spike, 1–4 cm. long; bracts rotund-ovate to ovate, 6–10 mm. long, 5–7 mm. broad, short-acuminate or cuspidate at the apex, rounded, abruptly contracted below the middle into a subpetiolate base, appressed-hispidulous and intermixed with multicellular hispid hairs on the outer surface, more conspicuously so on the nerves, closely hispid-ciliate, mucronate tip 0.5–1 mm. long, more or less recurved; bracteoles 1–3, linear-lanceolate, 2–3.2 mm. long, hispid; calyx-lobes 4, linear-lanceolate, about 2 mm. long, hispid; corolla 10 mm. long, middle lobe of the anterior lip obovate-oblong, 5 mm. long, 1.8 mm. broad, concave, lateral lobes obovate-oblong, 5.5 mm. long, 2 mm. broad, posterior lip oblong-obovate, 5.4 mm. long, 1.3 mm. broad, subemarginate; pollen-grain about 28 × 20 μ; capsule 5 mm. long, 1.8 mm. broad, hirsute near the apex, the constricted base 2 mm. long; seeds 4, 1.5 × 1.2 mm.

DISTRIBUTION: Central America to northern South America, and the Galapagos Islands.

GUATEMALA: Agua Blanca, Nov. 1913, *Tejada 95* (US).

SALVADOR: vicinity of Santa Ana, Dept. Santa Ana, alt. 655–800 m., 8 Jan. 1922, *Standley 19705* (G, US, NY); vicinity of Sonsonate, Dept. Sonsonate, alt. 220–300 m., 18–27 March 1922, *Standley 21770* (G, US).

NICARAGUA: without definite locality, coll. of 1867–68, *Tate 296* (K).

PANAMA: Penonome and vicinity, alt. 15–300 m., 23 Feb.–22 March 1908, *Wil-*

liams 176 (US); Taboga Island, 26–27 Feb. 1923, *Macbride 2787* (G); same locality and date, *Macbride 2789* (US, NY, F); Taboga Island, Dec. 1923, *Standley 27042, 27866, 27979* (US); Balboa, Canal Zone, thicket, Nov. 1923–Jan. 1924, *Standley 32111* (US).

COLOMBIA: Santa Marta, coll. 1822, *Bertero, without number* (M, B, Utrecht); thicket, Dept. Bolivar, alt. 120–170 m., 25 Jan. 1918, *Pennell 4026* (US); Santa Marta, 1898–99, *H. H. Smith 1408* (US, NY, M, B, F, PhilAcad); same locality and date, *H. H. Smith 1973* (US, NY, M, F, PhilAcad).

ECUADOR: Recreo, 16 Dec. 1896, *Eggers 15466* (F); Puna, Guayaquil, without date, *Sinclair, without number* (K TYPE, M photo).

GALAPAGOS ISLANDS: ALBEMARLE ISLAND: without definite locality or date, *Darwin, without number* (K); Iguana Cove, 21 May 1932, *Howell 9408* (CalAcad); Iguana Cove, 30 Dec. 1898, *Snodgrass & Heller 34* (G, US), and 4 March 1899, *87* (G, D); Tagus Cove, alt. "from coast" to 400 m., June 1899, *Snodgrass & Heller 213* (G, D); North Mt., Elizabeth Bay, 25 Feb. 1899, *Snodgrass & Heller 288* (G, US); Crowley Bay, alt. 550 m., 10 Aug. 1905–06, *Stewart 3462* (G); side of cliff above Iguana Cove, 17 March 1905–06, *Stewart 3464* (G, US, M, CalAcad).—INDEFATIGABLE ISLAND: Academy Bay, lower parts, 12 July 1905–06, *Stewart 3469*, and north side, alt. above 60 m., 24 Nov. 1905–06, *3470* (CalAcad).—JAMES ISLAND: lava beds, north side, James Bay, 6 Aug. 1905–06, *Stewart 3471* (G, CalAcad); James Bay, alt. 390 m., 26 Dec. 1905–06, *Stewart 3472* (G); James Bay, 4 June 1932, *Howell 9654* (CalAcad).

The type specimen of this species has broad ovate leaves and broad ovate-rotund bracts with intermixed closely puberulent and longer hispid hairs on the outer surface. The rather close arrangement of the imbrication in the inflorescence presents a noticeable four-angled appearance in cross-section. The species differs noticeably from *T. hispidum*, probably the most widespread species, in having broader leaves and bracts and a more closely imbricated inflorescence.

1a. T. nervosum Nees var. **angustifolium** Nees in DC. Prodr. **11**: 468. 1847; Seem. Bot. Voy. Herald, p. 325. 1856; Hemsl. Biol. Cent.-Am. Bot. **2**: 526. 1882.

Stems slender; leaves lanceolate to lanceolate-ovate; bracts ovate-oblong, 8–9 mm. long, 5–6 mm. broad, glabrate except for a few scattered appressed-hirsute hairs along the nerves on the outer surface, conspicuously hirsute-ciliate, apex more or less erect.

DISTRIBUTION: western and southern Mexico.

SINALOA: Mazatlan, alt. 10 m., Dec. 1925, *Ortega 5984* (G, US, PhilAcad).

NAYARIT: without definite locality and date, *Sinclair, without number* (K TYPE, M photo); Tiger Mine, Acaponeta, 1 March 1927, *Jones 23042* (P); Acaponeta, Feb. 1895, *Lamb 620* (G, NY); vicinity of Acaponeta, April 1910, *Rose, Standley & Russell 14277* (G, US, NY).

GUERRERO: southeastern Guerrero, 10 May 1930, *A. Schultze 503* (B).

This variety differs from the species in having narrower and more slender lanceolate leaves, bracts tending towards the oblong-ovate type, with less pubescence on the surface, and a closer ciliation. It also has a more northern geographical distribution.

2. T. ovatum Oersted in Kjoeb. Vidensk. Meddel. p. 169. 1854; Hemsl. Biol. Cent.-Am. Bot. **2**: 526. 1882.

Stems branched, stoutish, at first evenly pilose, later pilose in lines, or glabrous; leaves lanceolate to lanceolate-ovate, 1.5–5 cm. long, 0.1–3 cm. broad, glabrous on both surfaces, or occasionally with scattered pilose hairs, more distinctly so on the midrib and nerves, inconspicuously pilose-ciliate; petioles 0.1–2 cm. long, evenly pilose to pubescent in lines; inflorescences more or less loosely spicate, spikes 1–4 cm. long, internodes 1–2 mm. long; bracts ovate to obovate, 6–8 mm. long, 5–6 mm. broad, rounded and mucronate at the apex, abruptly contracted below the middle into a subpetiolate base, about 2 mm. long, nerves prominent, closely puberulent on the outer surface, closely-ciliate, erect at the apex, mucro about 0.4 mm. long; bracteoles sometimes 2, lanceolate-linear, 3 mm. long, pubescent; calyx-lobes 5, linear-lanceolate, pubescent; corolla 16 mm. long, middle lobe of the anterior lip obovate, 7 mm. long, 3 mm. broad, concave, lateral lobes oblanceolate-ovate, 8 mm. long, 3 mm. broad, posterior lip obovate-oblong, 7.5 mm. long, 2.7 mm. broad, emarginate; pollen-grains $28 \times 20\ \mu$; capsule 4 mm. long, 2 mm. broad, pubescent near the apex, the constricted base about 1.5 mm. long; seeds 4, 1.2×1 mm.

DISTRIBUTION: southern Mexico.

OAXACA: Puerto Angel, "at sea-level," 12 April 1933, *Morton & Makrinius 2620* (US); San Augustine, Oct. 1842, *Liebmann 10753* (US, B, K, Cop TYPE, M photo, F photo).

This species is closely related to *T. nervosum,* but differs in having bracts with a longer subpetiolate base, more obtuse to rounded apex, more prominent nerves, and a closer short puberulence on the outer surface.

3. T. Standleyi Happ, n. sp.[3]

Shrub about 0.5–1.3 m. high; stems branched, slender, at first evenly pilose, later the pubescence disposed in lines, or glabrous; leaves ovate to lanceolate-ovate, 2–3 cm. long, 0.5–1 cm. broad, mostly glabrate on both surfaces, occasionally with inconspicuous sparsely scattered hairs on the midrib and nerves; petioles 1–3 mm. long, evenly and inconspicuously pubescent to glabrous; inflorescences more or less loosely spicate, spikes 1–4.5 cm. long; bracts mostly ovate to rotund-ovate, about 12 mm. long, 7–8 mm. broad, mucronate, obtusish to rounded, mostly rounded at the base, closely and minutely appressed-puberulent on both surfaces, sparsely hirsute-ciliate, apex erect, mucro inconspicuous; bracteoles 2, lanceolate-linear, 4 mm. long, hirsute; calyx-lobes 4, linear-lanceolate, 2 mm. long, hirsute; corolla about 16 mm. long, middle lobe of the anterior lip oblong-obovate, about 8 mm. long, 2 mm. broad, concave, lateral lobes obovate-oblong, about 8 mm. long, 3 mm. broad, posterior lip oblong-obovate, about 8 mm. long, 2 mm. broad, subemarginate; capsules about 6 mm. long, 2 mm. broad, hirtellous near the apex, the constricted base 1.5 mm. long; seeds 4, 1.7 × 1.2 mm.

DISTRIBUTION: Salvador.

SAN SALVADOR: La Union, 12 Dec. 1895, *Brenning 193* (B); vicinity of La Union, Dept. La Union, alt. 150 m. or less, 13–21 Feb. 1922, *Standley 20680* (G, US TYPE, NY, M photo); vicinity of San Miguel, Dept. San Miguel, alt. about 110 m., 24–27 Feb. 1922, *Standley 21057* (G, US, NY); vicinity of San Vicente, Dept. San Vicente, alt. 350–500 m., *Standley 21171* (G, US); San Francisco, coll. of 1929, *Calderon 2486* (US, F).

This species appears to be rather generally distributed in certain sections of Salvador. Further collections should contribute additional information as to its more exact range and abundance. The rather loose inflorescence, the erect obtusish apex of the bracts, and the closely appressed, soft puberulence on the surface of the bracts are distinctive characters.

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[3] **T. Standleyi** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, pubescentibus vel glabris; foliis ovatis vel lanceolato-ovatis, 2–3 cm. longis, 0.5–1 cm. latis, parce pubescentibus vel glabris; petiolis 1–3 mm. longis; spicis 1–4.5 cm. longis, laxis; bracteis ovatis vel rotundo-ovatis, 12 mm. longis, 7–8 mm. latis, apice obtusis vel rotundis, basi rotundis, utrinque minute adpresso-puberulis, parce hirsuto-ciliatis, mucrone obscuro; bracteolis 2, lanceolato-linearibus, 4 mm. longis; calyce 4-partito; corolla 16 mm. longa.—Collected in the vicinity of La Union, Dept. La Union, San Salvador, alt. about 150 m., 13–21 Feb., 1922, *Standley 20680* (U. S. Nat. Herb., TYPE).

4. T. Hillii Happ, n. sp.[4]

Plant about 1 m. high; stems branched, slender, at first evenly glandular-hirsute, later pubescent in lines, or glabrous; leaves ovate to elliptic-lanceolate, 1–2.5 cm. long, 0.5–1 cm. broad, acuminate, acute to obtusish at base, mostly 2–4-nerved on either side of the midrib, scabrous, glandular-hirtellous intermixed with longer gland-tipped hairs, more conspicuously so on the midrib and nerves; petioles 1–6 mm. long, evenly glandular-pubescent; inflorescences more or less closely spicate, spikes 1–3 cm. long, internodes 1.5–3 mm. long; bracts ovate to rotund-ovate, 6–9 mm. long, about 4 mm. wide, mucronate, often abruptly contracted below the middle to a subpetiolate base, glandular-hirtellous intermixed with scattered multicellular gland-tipped hairs, slightly recurved near the apex, mucro 0.2–0.5 mm. long, conspicuously recurved; bracteoles 2, linear-lanceolate, 6–8 mm. long, about 1 mm. broad, obtuse, glandular-puberulent intermixed with longer simple hairs; calyx-lobes 5, filiform, about 5 mm. long, minutely glandular-puberulent intermixed with scattered longer hairs; corolla 20–22 mm. long, blue and white, the middle lobe of the anterior lip subsagittate and abruptly narrowed below the middle to the base, about 12 mm. long and 7 mm. broad, concave, lateral lobes obovate-oblong, about 13 mm. long and 7 mm. broad, obtuse, posterior lip oblong-obovate, usually 12.5 mm. long, 4 mm. broad, emarginate; pollen-grains about 29 × 21 μ;

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[4] **T. Hillii** Happ, sp. nov.; caulibus ramosis gracilibusque, glanduloso-hirsutis vel glabris; foliis ovatis vel elliptico-lanceolatis, 1–2.5 cm. longis, 0.5–1 cm. latis, apice acuto basi acuto vel obtuso, utrinque ex medio-nervo 2–4 nervis, utrinque parce glanduloso-hirtellis et parce glanduloso-pilosis; spicis plus minusve densis, 1–3 cm. longis, internodiis 1.5–3 mm. longis; bracteis rotundo-ovatis, 6–9 mm. longis, 4 mm. latis, apice acuminato, basi obtuso, glanduloso-puberulis et glanduloso-pilosis, mucrone saepe recurvo; bracteolis 2; calyce 5-partito; corolla 20–22 mm. longa.—Collected at Coyuca-Ancon, Distr. Coyuca, Guerrero, Mexico, 3 March 1934, *Hinton 5724* (Herb. Roy Bot. Gard. Kew, TYPE).

capsules about 6 mm. long, 2.5 mm. broad, glabrous; the constricted base 2 mm. long; seeds 4, 1.8 × 1.6 mm.

DISTRIBUTION: southwestern Mexico.

GUERRERO: Coyuca-Ancon, Distr. Coyuca, 3 March 1934, *Hinton 5724* (K TYPE, M, M photo).

This species can be readily distinguished from its nearest ally, *T. Hintonii*, by the more ovate-elliptic leaves, looser and less glandular pubescence on the leaf surface, fewer and less conspicuous nerves on either side of the leaf midrib, and the more obtuse apex of the bracts.

5. **T. leptocaule** Happ, n. sp.[5]

Plant 1–5 dm. high; stems branched, slender, at first evenly pubescent and glandular-puberulent, later pubescent in lines, or glabrous; leaves lanceolate to ovate, 0.5–5 cm. long, 0.3–3 cm. broad, acuminate, obtusish, acute to obtuse at the base, at first sparingly pubescent, later glabrate and minutely glandular-puberulent; petioles 0.1–2.5 cm. long, evenly pubescent to pubescent in lines, or glabrous; inflorescences more or less loosely spicate, spikes 1–3 cm. long, internodes usually 2–3 mm. long; bracts mostly ovate, 4–6 mm. long, 2.5–3 mm. broad, mucronate, acute to mostly obtuse or rounded, obtuse to rounded at the base, minutely glandular-puberulent occasionally intermixed with longer hirsute hairs, erect at the apex, mucro about 0.2 mm. long; bracteoles 2, 2–3 mm. long, 0.2 mm. broad, linear, puberulent; calyx-lobes 5, filiform, about 2 mm. long, puberulent; corolla about 10 mm. long, middle lobe of the anterior lip obovate-oblong, about 5 mm. long, 2 mm. broad, slightly concave, lateral lobes lanceolate-obovate, 5–6 mm. long, about 2.5

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[5] **T. leptocaule** Happ, sp. nov., herbacea perennis; caulibus ramosis gracilibusque, pubescentibus et glanduloso-puberulis vel glabris; foliis lanceolato-ovatis, 0.5–5 cm. longis, 0.3–3 cm. latis, parce pubescentibus et minute glanduloso-puberulis vel glabris; petiolis 0.1–2 cm. longis; spicis plus minusque laxis, 1–3 cm. longis, internodiis 2–3 mm. longis; bracteis ovatis, 4–6 mm. longis, circiter 3 mm. latis, glanduloso-puberulis et parce pubescentibus, apice erecto; bracteolis 2, circiter 3 mm. longis, puberulis; calyce 5-partito; corolla circiter 10 mm. longa.—Collected on dry llano, Tacupa, Distr. Huetamo, Michoacan, Mexico, 17 Jan. 1934, *Hinton 5494* (Herb. Roy. Bot. Gard. Kew, TYPE).

mm. broad, posterior lip obovate, narrowed at the base, about 5.5 mm. long, 2.5 mm. broad, subemarginate; stigma inconspicuously 2-lobed, stigmatic surface protruded upwardly; pollen-grains about 18 × 23 μ; capsules about 3.5 mm. long and 1 mm. broad, puberulent from the apex nearly to the base, constricted base about 1 mm. long; seeds 4, about 0.7 × 0.8 mm.

DISTRIBUTION: southwestern Mexico.

MICHOACAN: dry llano, Tacupa, Distr. Huetamo, 17 Jan. 1934, *Hinton 5494* (K TYPE, M, M photo).

GUERRERO: barranca, Jaripo, Distr. Coyuca, 27 March 1934, *Hinton 5841* (K, M, M photo).

The more lanceolate secondary leaves, the occasionally longer pubescence on the leaf surface, and the more obtuse bracts distinguish this species from the closely related *T. tenuissimum.*

6. T. fruticosum T. S. Brandegee in Zoe **5**: 171. 1903.

Frutescent plant, 1–3 dm. high; stems freely branched, branches slender, at first minutely puberulent intermixed with sparsely scattered longer hairs, later inconspicuously pubescent in lines, or glabrous; leaves lanceolate to ovate, 1–3 cm. long, 0.5–1 cm. broad, gradually acuminate, mucronate, rounded to obtuse at the base, at first puberulent intermixed with longer hairs, more conspicuously so on the midrib and nerves, ciliate, later glabrate; inflorescences more or less loosely spicate, spikes 1–6 cm. long, internodes usually 2 mm. long; bracts oblong-ovate, 7–15 mm. long, 4–6 mm. broad, gradually acuminate, rounded to subtruncate, mucronate, cuneate and gradually narrowed below the middle into a subpetiolate base, at first closely glandular-puberulent intermixed with sparsely scattered longer hairs, later glabrate, inconspicuously ciliate, erect at the apex, mucro 0.2 mm. long; bracteoles 2, linear-lanceolate, 7–10 mm. long, 0.5–0.8 mm. broad, pilose; calyx-lobes 5, lanceolate, 5 mm. long, pilose; corolla 10–12 mm. long, straw-colored, middle lobe of the anterior lip obovate, 5–6 mm. long, about 3 mm. broad, slightly concave, lateral lobes lanceolate-obovate, 6–7 mm. long, 3 mm. broad, posterior lip obovate, narrowed to the base, 6 mm. long, about 2.7 mm. broad, subemarginate; pollen-grains about 28 × 25 μ; capsules 5–6 mm. long, about 2 mm. broad, glabrous, the constricted base about 2 mm. long; seeds 4, 1.8 × 1.2 mm.

DISTRIBUTION: Lower California, Mexico.

LOWER CALIFORNIA: Purisima, Comondu, 15 Feb. 1889, *Brandegee 450* (NY, UCal); Cajoncito, Cape Region, 18 Oct. 1892, *Brandegee, without number* (UCal); "Central Baja California," without date, *Purpus, without number* (UCal); Cañons San Pablo, alt. 300 m., Jan.–March 1898, *Purpus 83* (US, F, UCal, D); San Jose del Cabo, coll. of 1901, *Purpus 489* (G, US, NY, M, M photo, UCal TYPE); above Primiera Agua, near Loreto, 20 Oct. 1930, *Jones 27390* (M).

As at present known, this species is confined to Lower California. The rather slender leaves and the oblong-ovate bracts, with a glandular-puberulent to glabrous surface and a sparse ciliation, are distinctive characters.

7. **T. ovalifolium** Oersted in Kjoeb. Vidensk. Meddel. p. 170. 1854; Hemsl. Biol. Cent.-Am. Bot. **2**: 526. 1882.

Stems branched, slender, at first evenly pilose, later pubescent in lines, or glabrous; leaves mostly ovate-elliptic, occasionally lanceolate-elliptic, 0.5–3 cm. long, 0.2–1.5 cm. broad, acuminate, obtusish-rounded, mucronate, cuneate below the middle into an obtuse base, at first scattered-pilose on both surfaces, more apparently so on the midrib and nerves, later glabrate, inconspicuously ciliate; petioles 0.1–1 cm. long, pilose; inflorescences closely spicate, spikes 1–3 cm. long, internodes usually 1 mm. long; bracts elliptic-obovate, 6–8 mm. long, 3–4 mm. broad, rounded, mucronate, gradually narrowed below the middle into a cuneate acute base, pilose on the outer surface, more conspicuously so on the nerves, closely ciliate, 0.8–1 mm. long, slightly recurved at the apex, mucro inconspicuous, 0.1–0.2 mm. long; bracteoles 2, lanceolate-linear, 5 mm. long, pilose; calyx-lobes 5, filiform, pilose; corolla 8–9 mm. long, middle lobe of the anterior lip obovate, 4 mm. long, 1.5 mm. broad, lateral lobes oblanceolate-obovate, 5 mm. long, 1.5 mm. broad, posterior lip obovate-oblong, 4.5 mm. long, 1.3 mm. broad, subemarginate; pollen-grains about 27 × 20 μ; capsule 4–5 mm. long, 2 mm. broad, glabrous, the constricted base about 1.5 mm. long, seeds 4, 1.2 × 1 mm.

DISTRIBUTION: central Mexico.

PUEBLA: "Achapulco," Dec. 1841, *Liebmann 10752* (Cop); "Chapulco," Dec. 1841, *Liebmann 10752* (K); "Achapulco," May 1842, *Liebmann 10752* (Cop TYPE, M photo, F photo).

This plant has a rather small elliptic-ovate leaf and a small elliptic bract with a close ciliation.

8. **T. Calderonii** Happ, n. sp.[6]

Suffrutescent plant; stems freely branched, at first evenly glandular-puberulent intermixed with simple hairs, later pilose in lines, or glabrous; leaves lanceolate-ovate to ovate, 1–6 cm. long, 0.5–3.5 cm. broad, long-acuminate, obtuse, sometimes mucronulate, obtuse to rounded at the base, at first with scattered appressed hairs on both surfaces, more conspicuously so on the midrib and nerves, later glabrate; petioles 0.2–3 cm. long, pilose to glabrous; inflorescences closely spicate, spikes 1–5 cm. long, internodes 1–2 mm. long; bracts elliptic-ovate, 10–12 mm. long, rounded, mucronate, rounded and abruptly contracted much below the middle to a subpetiolate base, sparsely hirsute, especially on the nerves, inconspicuously intermixed with scattered minute glandular-puberulent hairs, ciliate, apical portion erect, mucro 0.4 mm. long; bracteoles 2, linear-lanceolate, 6–7 mm. long, glandular-puberulent, ciliate; calyx-lobes 4, linear-lanceolate, 5 mm. long, sparsely puberulent, ciliate; corolla 16–17 mm. long, middle lobe of the anterior lip obovate-oblong, 9 mm. long, 3 mm. broad, concave, lateral lobes oblanceolate-ovate, 10 mm. long, 4 mm. broad, posterior lip oblong-ovate, 9.5 mm. long, 2.5 mm. broad, subemarginate, all lobes sparsely ciliate near the base; pollen-grains about 30 × 20 μ; capsule 4–5 mm. long, about 2 mm. broad, puberulent, more conspicuously so near the apex, the constricted base about 1.5 mm. long; seeds 4, 1.3 × 1.2 mm.

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[6] **T. Calderonii** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-puberulis et pilosis vel glabris; foliis lanceolato-ovatis vel ovatis, 1–6 cm. longis, 0.5–3.5 cm. latis, apice acuminato, basi obtuso vel rotundo, utrinque adpresso-pilosis vel glabratis; petiolis 0.2–3 cm. longis, pilosis vel glabris; spicis densis, 1–5 cm. longis, internodiis 1–2 mm. longis; bracteis elliptico-ovatis, 10–12 mm. longis, rotundis, basi abrupte contracto, sparse pilosis et minute glanduloso-puberulis, ciliatis; calyce 4-partito; corolla 16–17 mm. longa.—Collected at Hacienda Concordia, Dept. Usulután, Salvador, Jan. 1924, *Calderon 2098* (N. Y. Bot. Gard. Herb., TYPE).

DISTRIBUTION: Salvador.

SALVADOR: Hacienda Concordia, Dept. Usulután, Jan. 1924, *Calderon 2098* (US, NY TYPE, M photo); Hacienda San Antonio, Dept. San Miguel, Jan. 1924, *Calderon 2123* (G, US); shaded bank, vicinity of Ahuachapan, Dept. Ahuachapan, alt. 800–1000 m., 9–27 Jan. 1922, *Standley 19736* (G, US, M).

This species with ovate-oblong bracts with erect apex and inconspicuous glandular-puberulence on the outer surface is quite distinct from its close ally, *T. nervosum.*

9. T. macrostachyum Happ, n. sp.[7]

Stems branched, branches slender, at first evenly pilose intermixed with inconspicuous gland-tipped hairs, later pubescent in lines, or glabrous; leaves lanceolate-ovate to lanceolate, 1–5 cm. long, 0.5–3 cm. broad, obtusish, mucronulate, rounded to obtuse at the base, at first appressed-pilose on both surfaces, more conspicuously so on the midrib and nerves, later sparsely so; petioles 0.3–1.5 cm. long, evenly pilose to pubescent in lines; inflorescences more or less loosely spicate, spikes 4–17 cm. long, internodes usually about 2 mm. long; bracts obovate-oblanceolate, 7–9 mm. long, 2.5–3.5 mm. broad, rounded to obtusish, mucronate, cuneate and contracted from above the middle into a subpetiolate base, conspicuously pilose sparsely intermixed with gland-tipped hairs, erect at the apex, mucro about 0.2 mm. long; bracteoles 2, lanceolate-linear, 6–8 mm. long, puberulent intermixed with inconspicuous gland-tipped hairs; calyx-lobes 5, filiform, about 3 mm. long, pubescent; corolla 16 mm. long, white, middle lobe of the anterior lip obovate, 8 mm. long, 4 mm. broad, concave, lobes oblanceolate-obovate, 9 mm. long, 4 mm. broad, posterior lip obovate-oblong, 7.5 mm. long, 3.8 mm.

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[7] **T. macrostachyum** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, piloso-glandulosis et pubescentibus vel glabratis; foliis lanceolato-ovatis, 1–5 cm. longis, 0.5–3 cm latis, apice acuminato, basi rotundo vel obtuso, utrinque adpresso-pilosis; inflorescentiis plus minusve laxis; spicis 4–17 cm. longis; bracteis obovato-lanceolatis, 7–9 mm. longis, 2.5–3.5 mm. latis, rotundis vel obtusis cuneatisque, supra medium ad basem subpetiolatum contractis, pilosis et parce glandulosis, erectis; calyce 5-partito; corolla 16 mm. longa; stigma exserta.—Collected at Orilla, Balsas River, Guerrero, Mexico, alt. 25 m., 12 May 1898, *Langlassé 161* (U. S. Nat. Herb., TYPE).

broad, subemarginate; stigma inconspicuously 2-lobed, stigmatic surface protruded upwardly; pollen-grains 28 × 20 μ; capsules 5 mm. long, 1.5 mm. broad, puberulent near the apex, the constricted base about 2 mm. long; seeds 4, 1 × 0.8 mm.

DISTRIBUTION: southwestern Mexico.

GUERRERO: Orilla, Balsas River, alt. 25 m., 12 May 1898, *Langlassé 161* (K, G, US TYPE, M photo).

The unusually long spike and the closely glandular-pilose bracts contracted above the middle to a narrow subpetiolate base are distinctive characters of this species.

10. T. nemorum T. S. Brandegee in Univ. Calif. Publ. Bot. **4**: 386. 1913.

Plant 3–5 dm. high; stems freely branched, branches slender, at first evenly and densely glandular-pilose, later pubescent in lines, or glabrous; leaves ovate, 1–4 cm. long, 1.5–2.5 cm. broad, acuminate, obtusish, cordate to truncate at the base, glandular-puberulent, more conspicuously so on the midrib and nerves, later sparsely puberulent occasionally intermixed with short gland-tipped hairs; inflorescences more or less loosely spicate, spikes 1–2 cm. long, internodes about 1 mm. long; bracts oblanceolate-elliptic, 6–7 mm. long, 1.5–2.5 mm. broad, rounded, mucronate, rounded and contracted above the middle into a subpetiolate base 3–4 mm. long, conspicuously pilose intermixed with glandular puberulence; bracteoles 2, linear-lanceolate, 5–6 mm. long, glandular-pilose; calyx-lobes 5, filiform, glandular-pilose; corolla 15 mm. long, middle lobe of the anterior lip obovate, 7 mm. long, 4 mm. broad, concave, lateral lobes oblanceolate-ovate, 8 mm. long, 4 mm. broad, posterior lip about 7.5 mm. long, 4 mm. broad, subemarginate; pollen-grains 20 × 25 μ; capsule 3.5 mm. long, 1.8 mm. broad, glabrous, the constricted base 1 mm. long; seeds 4, 1.0 × 0.9 mm.

DISTRIBUTION: southern Mexico.

VERA CRUZ: Baños del Carrizal, Aug. 1912, *Purpus 6071* (UCal TYPE, M photo).

The cordate leaf, short and inconspicuous spike, and the elliptic-ovate, densely pubescent bract are distinctive characters of this species and unusual in the genus.

11. T. sessilifolium Happ, n. sp.[8]

Plant 3–5 dm. high; stems slender, at first evenly glandular-pilose, later densely pilose in lines to glabrate; lower cauline leaves ovate, upper cauline leaves lanceolate to linear, 0.5–2.5 cm. long, 0.5–1.2 cm. broad, roundish-obtuse, mucronate, rounded to obtusish at the base, sparsely stoutish-pilose on both surfaces, inconspicuously recurved-ciliate; petioles of lower cauline leaves about 0.5 mm. long, upper cauline leaves sessile; inflorescences more or less closely spicate, spikes 2.5–3 cm. long, internodes usually 1–2 mm. long; bracts lanceolate-ovate, 8–11 mm. long, 3–6 mm. broad, acuminate, mucronate, slightly cuneate at the base, glandular-pilose, erect at the apex, mucro 0.5 mm. long; bracteoles 2, linear-lanceolate, 8–9 mm. long, 1 mm. broad, glandular-pilose; calyx-lobes 5, linear-lanceolate, 6 mm. long, glandular-pilose; corolla 11–12 mm. long, middle lobe of the anterior lip obovate, 6.5 mm. long, 2.5 mm. broad, lateral lobes oblanceolate-obovate, 7 mm. long, 2.8 mm. broad, posterior lip obovate-oblong, 6.8 mm. long, 2.3 mm. broad, subemarginate; pollen-grains about 28 × 22 μ; capsules 7.2 mm. long, 2.9 mm. broad, puberulent, more conspicuously so near the apex, the constricted base 3 mm. long; seeds 4, 2 × 1.8 mm.

DISTRIBUTION: southwestern Mexico.

JALISCO: near Chapala, 5 Oct. 1903, *Rose & Painter 7618* (US TYPE, M photo).

The sessile upper leaves and the acuminate lanceolate-ovate bracts, together with the rather soft glandular pubescence, are distinctive characters of this species.

12. T. glutinosum Lindau ex Loesen. in Bull. Herb. Boiss. **2**: 565. 1894.

Stems branched, branches stoutish, at first glandular-puberulent intermixed with longer glandular hairs, later densely lanate in lines; leaves elliptical to lanceolate-ovate, 1–5 cm. long, 0.4–2.2 mm. broad, in the early stages rounded, later gradually acuminate, obtusish, mucronulate, obtuse to acutish at the base, densely glandular-lanate to somewhat tomentose on both surfaces; petioles 0.1–1 cm. long, glandular-puberulent intermixed with longer glandular to densely lanate hairs distributed in lines; inflorescences closely spicate, spikes 1–3 cm. long, internodes usually 1–2 mm. long; bracts elliptic-ovate, 7–10 mm. long, 3–4 mm. broad, acuminate, obtuse, mucronate, slightly cuneate and narrowed below the middle to a subpetiolate base, densely glandular-puberulent intermixed with longer glandular hairs, erect at the apex, mucro 0.3 mm. long; bracteoles 2, linear to linear-lanceolate, 7–10 mm. long, 1–1.5 mm. broad, obtuse to rounded, mucronulate, pubescence similar to that of the bracts; calyx-lobes 5, lanceolate, 5–6 mm. long, puberulent; corolla 12 mm. long, anterior and posterior lips about 7 mm. long; pollen grains about 43 × 30 μ.

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[8] **T. sessilifolium** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-pilosis vel glabris; foliis ovatis vel lanceolato-linearibus, 0.5–2.5 cm. longis, 0.5–1.2 cm. latis, apice rotundo vel obtuso, basi rotundo, utrinque parce pilosis, sessilibus; spicis densis, 2.5–3 cm. longis; bracteis lanceolato-ovatis, 8–11 mm. longis, 3–6 mm. latis, acuminatis, basi subcuneato, glanduloso-pilosis; bracteolis 2, 8–9 mm. longis; calyce 5-partito; corolla 11–12 mm. longa.—Collected near Chapala, Jalisco, Mexico, 5 Oct. 1903, *Rose & Painter 7618* (U. S. Nat. Herb., TYPE).

DISTRIBUTION: southern Mexico.

MORELOS: near Xochicalco, Distr. Cuernavaca, Dec. 1887, *Seler 401* (B TYPE).

This species is readily recognized on account of the sublanate character of the pubescence.

13. T. Langlassei Happ, n. sp.[9]

Stems branched; branches stoutish, at first glandular-puberulent intermixed with scattered glandular-pilose hairs, later puberulent and pubescent in lines, more or less glabrate; leaves on the lower branches lanceolate, 1–3.5 cm. long, 0.2–1 cm. broad, upper leaves frequently ovate, 5–6 cm. long, gradually acuminate, mucronate, rounded to subcordate at the base, at first glandular-puberulent occasionally intermixed with glandular-pilose hairs on both surfaces, more conspicuously so on the midrib and nerves, later glabrate; petioles 0.2–1.5 cm. long, evenly glandular-puberulent occasionally intermixed with glandular-pilose hairs, to pubescent in lines; inflorescence closely spicate, spikes about 1.2 cm. long, internodes usually about 1 mm. long; bracts lanceolate to lanceolate-ovate, 5–6 mm. long, 1.5–2 mm. broad, acuminate, acute, mucronate, cuneate and gradually contracted below the middle into a subpetiolate base, glandular-puberulent closely intermixed with long simple pilose hairs, apex slightly recurved, mucro about 0.2 mm. long; bracteoles 2, lanceolate-linear, 4–5 mm. long, puberulent sparsely intermixed with pubescent hairs; calyx-lobes 5, filiform, 3–4 mm. long, glandular-pubescent; corolla 14 mm. long, white, middle lobe of the anterior lip obovate, 7 mm. long, 4 mm. broad, lateral lobes oblanceolate-obovate, 8 mm. long, 4 mm. broad, posterior lip oblong-obovate, about 7 mm. long, 3 mm. broad, subemarginate; pollen-grains about $25 \times 20\ \mu$; capsules 6 mm. long, 2 mm. broad, pubescent near the apex, the constricted base about 2 mm. long; seeds 4, 1.8 × 1.2 mm.

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[9] **T. Langlassei** Happ, sp. nov., herbacea perennis; caulibus ramosis, glanduloso-puberulis et parce glanduloso-pilosis vel glabris; foliis lanceolatis vel ovatis, 1–6 cm. longis, 0.2–2 cm. latis, apice acuminato, basi rotundo vel subcordato, ultrinque glanduloso-puberulis et parce glanduloso-pilosis vel glabris; petiolis 0.2–1.5 cm. longis; spicis densis, circiter 1.2 cm. longis, internodiis 1 mm. longis; bracteis lanceolatis vel lanceolato-ovatis, 5–6 mm. longis, 1.5–2 mm. latis, apice acuminato, basi cuneato, glanduloso-puberulis et glanduloso-pilosis, apice parce recurvato; bracteolis 2; calyce 5-partito; corolla 14 mm. longa.—Collected at San Geromito, Guerrero, Mexico, alt. 75 m., *Langlassé 713* (Gray Herb. TYPE).

DISTRIBUTION: southwestern Mexico.

GUERRERO: San Geromito, alt. 75 m., *Langlassé 713* (G TYPE, US, K, B, M photo).

The rather large primary leaves, short spikes, and small densely pubescent, closely imbricated bracts render this species of easy recognition.

14. **T. Hintonii** Happ, n. sp.[10]

Plant 1 m. high; stems branched, at first densely glandular-pilose, later pilose in lines, more or less glabrate; leaves ovate to elliptical-lanceolate, 1–2.5 cm. long, 0.5–1 cm. broad, acuminate, obtusish, mucronulate at the apex, rounded-obtuse to acutish at the base, glandular-puberulent intermixed with longer glandular hairs on both surfaces, more conspicuously so on the midrib and nerves; petioles 0.1–0.7 mm. long, glandular-puberulent intermixed with longer glandular hairs; inflorescences more or less closely spicate, spikes 1–3 cm. long, internodes usually 1.5 mm. long; bracts lanceolate-ovate, 6–9 mm. long, 4–5 mm. broad, mostly acuminate, acute, and moderately contracted below the middle to a subpetiolate base, glandular-puberulent intermixed with longer glandular hairs, erect at the apex, mucro 0.2–1.2 mm. long, conspicuously recurved; bracteoles 2, 6–8 mm. long, about 1 mm. broad, linear-lanceolate, obtuse, glandular-puberulent intermixed with glandular-pilose hairs; calyx-lobes 5, filiform, about 5 mm. long, minutely glandular-puberulent sparsely intermixed with glandular-pilose hairs; corolla 20–22 mm. long, blue and white, the middle lobe of the anterior lip subsagittate and abruptly narrowed below the middle to the base, 12 mm. long, 7 mm. broad, concave, lateral lobes obovate-oblong, 13 mm. long, 7 mm. broad, obtuse, posterior lip oblong-obovate, 12.5 mm. long, 4 mm. broad, subemarginate; pollen-grains about 28 × 20 μ; capsules 6 mm. long, 2.5 mm. broad, glabrous, the constricted base 2 mm. long; seeds 4, 1.8 × 1.6 mm.

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[10] **T. Hintonii** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, dense glanduloso-pilosis vel glabris; foliis ovatis vel elliptico-lanceolatis, 1–2.5 cm. longis, 0.5–1 cm. latis, apice acuminato, basi rotundo vel acuto, utrinque glanduloso-puberulis et glanduloso-pilosis vel glabris, utrinque ex medio-nervo 2–4 nervis; spicis plus minusve densis, 1–3 cm. longis, internodiis 1.5–3 mm. longis; bracteis ovatis vel lanceolato-ovatis, 6–9 mm. longis, 4–5 mm. latis, apice rotundis, infra medium cuneatis, glanduloso-puberulis et glanduloso-hirsutis, mucrone recurvato; bracteolis 2, 6–8 mm. longis; calyce 5-partito; corolla 20–22 mm. longa.—Collected on hill, Guayabal, Distr. Temascaltepec, Mexico, 12 Feb. 1933, *Hinton 3375* (Herb. Roy. Bot. Gard. Kew, TYPE).

DISTRIBUTION: southwestern Mexico.

MEXICO: hill, Guayabal, Distr. Temascaltepec, 12 Feb. 1933, *Hinton 3375* (K TYPE, M, M photo); dry hill, Bejucos, Distr. Temascaltepec, alt. 610 m., 3 Nov. 1933, *Hinton 3589* (K, M).

This species is distinguished from its near relative, *T. Hillii,* by the more costate condition of the leaves, acuminate bracts, and closer and more glandular pubescence.

15. T. polystachyum Nees in Benth. Bot. Voy. Sulphur, p. 148. 1844; DC. Prodr. **11**: 468. 1847; Seem. Bot. Voy. Herald, p. 325, *pl. 68.* 1856, excluding specimen *Seemann 2112;* Hemsl. Biol. Cent.-Am. Bot. **2**: 526. 1882.

Plant subcaespitose; stems freely branched, branches slender, at first evenly glandular-hirtellous intermixed with occasional long simple hairs, later pubescent in lines, or glabrous;

leaves lanceolate to ovate, 1–5 cm. long, 0.5–2.5 cm. broad, acuminate to obtusish, mucronate, acute to rounded at the base, at first scattered appressed-pilose on both surfaces, more conspicuously so on the midrib and nerves, later glabrate; petioles 0.2–1.5 cm. long, pilose to glabrous; inflorescences more or less loosely imbricated, spicate, spikes 1–7 cm. long, internodes mostly 2 mm. long; bracts lanceolate-ovate, 11–12 mm. long, 4–5 mm. broad, obtusish, mucronate, mucro about 0.5 mm. long, cuneate and gradually contracted below the middle into a subpetiolate base, densely glandular-puberulent very sparsely intermixed with scattered appressed hairs, sparsely ciliate, apex erect; bracteoles 2, lanceolate-linear, 4–5 mm. long, glandular-puberulent intermixed with scattered hirsute hairs; calyx-lobes 4, lanceolate-linear, 2–3 mm. long, glandular-puberulent intermixed with hirsute hairs; corolla 11 mm. long, middle lobe of the anterior lip obovate-oblong, 6 mm. long, 3 mm. broad, lateral lobes obovate-oblanceolate, 7 mm. long, 3 mm. broad, posterior lip obovate-oblong, 6.3 mm. long, 2.8 mm. broad, all lobes sparsely short-ciliate near the base; pollen-grains about 32 × 20 μ; capsules 5 mm. long, 2 mm. broad, the constricted base 1.5 mm. long; seeds 4, 1.5 × 1.3 mm.

DISTRIBUTION: Central America.

HONDURAS: Tiger Island, Gulf of Fonseca, *Sinclair, without number* (K TYPE, M photo); vicinity of Amapala, Tiger Island, alt. 250 m. or less, 14 Feb. 1922, *Standley 20700* (G, US, NY).

The glabrate leaves and lanceolate-ovate bracts with close glandular pubescence are important diagnostic characters of this species.

16. T. tenuissimum Rose in Contrib. U. S. Nat. Herb. **1:** 349. 1895.

Plant 3–4 dm. high; stems freely branched, branches slender, at first evenly puberulent, later pilose in lines, more or less glabrate; leaves lanceolate to ovate, 1–7 cm. long, 0.3–4.5 cm. broad, acuminate, obtuse, mucronulate, acutish to rounded at the base, glandular-pubescent to glabrate on both surfaces except for scattered hirsute hairs usually on the midrib and nerves; petioles 0.1–2.5 cm. long, evenly glandular-puberulent to pilose in lines; inflorescences more or less loosely spicate, spikes 1–5 cm. long, internodes usually 1–2 mm. long; bracts lanceolate-ovate, 5–7 mm. long, 2–3 mm. broad, acuminate, obtusish, mucronate, closely glandular-puberulent, inconspicuously pilose-ciliate, apex erect, mucro about 0.3 mm. long; bracteoles 2, linear-lanceolate, 5 mm. long, puberulent, ciliate; calyx-lobes 5, filiform, 3 mm. long, puberulent, ciliate; corolla about 12 mm. long, white, middle lobe of the anterior lip obovate, 5.5 mm. long, 2.5 mm. broad, lateral lobes oblanceolate-ovate, 6 mm. long, 2.5 mm. broad, posterior lip obovate-oblong, about 6 mm. long, 2.3 mm. broad, subemarginate; stigma inconspicuously 2-lobed, stigmatic surface protruded upwardly; pollen-grains about 25 × 20 μ; capsule 3.7 mm. long, 1.5 mm. broad, puberulent near the apex, the constricted base 1 mm. long; seeds 4, 1.2 × 1 mm.

DISTRIBUTION: southwestern Mexico.

COLIMA: without definite locality, Feb. 1891, *Palmer 1297* (G, US TYPE, NY, M photo).

The slender bracts, with inconspicuous glandular pubescence, and the slight habit of this species are unusual in the genus.

17. T. hispidum Nees in DC. Prodr. **11**: 468. 1847; A. Gray, Syn. Fl. N. Amer. **2**^{1}: 331. 1878; Coult. in Contrib. U. S. Nat. Herb. **2**: 325. 1892; Lindau ex Loesen. in Bull. Herb. Boiss. **2**: 565. 1894; Standley in Contrib. U. S. Nat. Herb. **27**: 351. 1928. Pls. 28; 32, fig. 1; 33, figs. 3 & 8.

T. nervosum Nees var. *hispidum* Torr. in Emory, Bot. U. S. & Mex. Bound. Surv. **2**: 125. 1859.

Suffruticose plant, decumbent to ascending, 1 dm. to 1 m. high; stems several, freely branched, slender, at first evenly hispid, later pubescent in lines, to glabrate; leaves usually lanceolate to lanceolate-ovate, occasionally ovate, 0.5–5 cm. long, 0.1–2.5 cm. broad, usually acuminate to acute at the apex, acuminate to rarely subcordate at the base, at first scattered-pubescent on both surfaces, more conspicuously so on the midrib and nerves, later glabrate; petioles 0.1–1 cm. long, pubescent to glabrate; inflorescences more or less loosely spicate, spikes 1–5 cm. long; bracts usually lanceolate to lanceolate-ovate, occasionally ovate, usually acuminate to acute, occasionally obtusish at the apex, acuminate to acute at the base, contracted below the middle to a subpetiolate base, scattered-hispid on the outer surface, more conspicuously so on the nerves, hispid-ciliate, usually conspicuously recurved near the apex, mucro 0.5–0.8 mm. long; bracteoles 1–5, linear-lanceolate, 1–3 mm. long, hispidulous; calyx-lobes 4, linear-lanceolate, hispidulous; corolla 9–11 mm. long, middle lobe of the anterior lip oblong-obovate, about 5 mm. long, 1.3 mm. broad, obtusish at the apex, concave, lateral lobes ovate-oblong, about 5 mm. long, 2 mm. broad, posterior lip obovate, about 5 mm. long, 2 mm. broad, subemarginate; pollen-grains about $38 \times 20\ \mu$; capsules 4–5 mm. long, about 2 mm. broad, pubescent near the apex, the constricted base about 1.5 mm. long; seeds 4, 1.3×1.2 mm.

DISTRIBUTION: southwestern United States, Mexico, and Central America.

UNITED STATES.

TEXAS: ''de Bejar a la colonia d' Austin,'' April 1828, *Berlandier 1640 = 370* (K).

NEW MEXICO: ''Bravo del Norte near Puercos River,'' without date, *Schott, without number* (F).

ARIZONA: Titcomb Lake, 11 July 1919, *Stalmach 192* (UTex); Stone Cabin Canyon, Santa Rita Mts., 20 Sept.–4 Oct. 1902, *Griffiths & Thornber 74* (US, UAriz); Santa Rita Forest Reserve, 8–13 Sept. 1902, *Griffiths 3439* (US); fenced area, Santa Rita Forest Reserve, 27 Sept.–4 Oct. 1903, *Griffiths 5957* (US, M); north slope of Santa Rita Mts., 29–31 Aug. 1904, *Griffiths 7006* (M); Santa Rita Mts., 2 Sept. 1929, *Kearney 5987* (US); foot-hills of the Santa Rita Mts., 6 May 1881, *Pringle, without number* (G, US, NY, M, F, PhilAcad, P); same locality, 11 June 1884, *Pringle, without number* (NY, F, PhilAcad); arid gravelly hillsides, Stone Cabin Canyon, Santa Rita Mts., 6–10 July 1903, *Thornber, without number* (UAriz); Stone Cabin Canyon, Santa Rita Mts., alt. 1300 m., 15 Oct. 1903, *Thornber 103* (US, NY, M, UCal, D, P, UAriz); Santa Rita Range Reserve, 29 Sept. 1913, *Wooton, without number* (US); Santa Rita Mts., 10 Sept. 1914, *Wooton, without number* (US); near Patagonia, Santa Cruz Co., 31 May 1930, *Harrison 7177* (US, P); 8 miles south of Vail, alt. 1100 m., 31 Aug. 1903, *Jones, without number* (P); ''Babiroquivra Mts.,'' 19 Sept. 1929, *Jones 25003* (G, M, UCal, CalAcad, P, UTex); Patagonia, May 1902, *Orcutt, without number* (UCal); North Baboquivari Canyon, 11 Oct. 1925, *Peebles, Harrison & Kearney 399* (US); Baboquivari Mts., 21 Aug. 1932, *Peebles 8996* (US, P); Camp Crittenden, alt. 1400 m., coll. of 1874, *Rothrock 686* (G, US, F); South Cañon, Pima Co., 9 April 1928, *Thackery 127* (US).

MEXICO.

WITHOUT DEFINITE LOCALITY: Mexican Boundary Survey, *without collector, 731* (US); ''at locos mulcas,'' Dec. 1834, *Ehrenberg, without number* (B); ''Bade by Grande,'' without date, *Ehrenberg 678* (G, B); ''prope las ajuntas am Montezuma

Fluss,'' Jan. 1840, *Ehrenberg 1072* (G, B TYPE); without definite locality or date, *Parkinson, without number* (K); without definite locality or date, *Seler, without number* (US).

TAMAULIPAS: La Vegonia, vicinity of San José, alt. 800 m., 2 July 1930, *Bartlett 10032* (F); Cañon, La Tamaulipeca, vicinity of San Miguel, 29 July 1930, *Bartlett 10709* (US, F); Sierra de San Carlos, coll. of 1836, *Berlandier 3181* (G, NY, PhilAcad); vicinity of Victoria, alt. about 320 m., 1 Feb.–9 April 1907, *Palmer 86* (G, US, NY, M, F, UCal); Victoria, alt. 600 m., 23 March 1925, *Runyon 830* (US); base of mountains, near Victoria, alt. 400 m., 4 April 1926, *Runyon 943* (US); without definite locality, April 1926, *Runyon & Tharp 4053* (US).

NUEVO LEON: below Dawes, mountains near Monterey, alt. 600 m., July 1933, *C. H. & M. T. Mueller 297* (F); hills, near Monterey, 7 June 1888, *Pringle, without number* (F); calcareous soil, Monterey, alt. 500 m., 7 Sept. 1902, *Pringle 11080* (G, US, NY, M, F).

COAHUILA: Saltillo, coll. of 1878, *Parry 24* (G); Soledad, 25 miles southwest from Monclova, 9–19 Sept. 1880, *Palmer 1089* (G, US, NY, F, PhilAcad).

CHIHUAHUA: rocky hills, Santa Rosa, without date, *Bigelow, without number* (NY); Guayanopa Canyon, Sierra Madre Mts., alt. 1100 m., 24 Sept. 1903, *Jones, without number* (US, D, P); southwestern Chihuahua, Aug.–Sept. 1885, *Palmer 125* (G, US); same locality and date, *Palmer 125/203* (US, NY, K, PhilAcad).

SAN LUIS POTOSI: 22° N. Lat., alt. 1800–2500 m., coll. of 1878, *Parry & Palmer 700* (G, US, M, PhilAcad); Minas de San Rafael, Nov. 1910, *Purpus 4969* (M, F, UCal, P); Sierra de Guascama, June 1911, *Purpus 5230* (G, US, NY, M, F, UCal); near Tancanhuitz, Feb. 1888, *Seler 756* (B).

DURANGO: ''chaparrales zwischen Maximi u. Ojuelo,'' alt. 1300 m., 13 Sept. 1908, *Endlich 253* (B); sparingly about Iron Mt., city of Durango and vicinity, Sept. 1896, *Palmer 625* (G, US, NY, M, Cop, F, UCal).

SONORA: Canyon Sapopa, Rio Mayo, 19 Oct. 1934, *Gentry 1084* (M); Cochuto, alt. 1500 m., *Hartman 76* (G, US, F, UCal); gravelly wash in canyon, at head of San Carlos Bay, 8 July 1921, *Johnston 4362* (G, UCal, CalAcad); under shrubs, dry hills, 2 Dec. 1890, *Lloyd 443* (G); Magdalena, 6 Oct. 1922, *Orcutt 1352* (US); without definite locality, coll. of 1869, *Palmer 27* (G, US); Guaymas, Sept. 1887, *Palmer 240* (G, US); 5 miles below Minas Nuevas, 12 March 1910, *Rose, Standley & Russell 12672* (US, NY); along an arroya, vicinity of Alamos, 13 March 1910, *Rose, Standley & Russell 12741* (US, NY); hillsides, Santa Cruz, 25 Sept. 1857, *Thurber 918* (G, NY, F); along banks of dry stream, 5 mi. south of San Rafael, 21 Oct. 1932, *Wiggins 5942* (D); arroyo 2 mi. east of Rancho San Carlos, on road to Norio, 28 Oct. 1932, *Wiggins 6147* (D); valley of mountain stream near Sonoita, coll. of 1851, *Wright 1466* (G, NY, M, PhilAcad, UCal).

LOWER CALIFORNIA: ''Sierra de Laguna,'' 21 Jan. 1890, *Brandegee, without number* (NY, UCal).

ZACATECAS: without definite locality, *Coulter 1206* (G, K).

SINALOA: Mazatlan, 3 Nov. 1893, *Brandegee, without number* (US, UCal); Culiacan, 7 Sept. 1904, *Brandegee, without number* (G, US, UCal); Presidio de Mazatlan, 7 June 1849, *Gregg 1163* (M); San Blas, 30 Jan. 1927, *Jones 23043* (F, P); Rosario, Jan. 1895, *Lamb 454* (G, D); Cerro del Cajon, Pueblo de las Francas, alt. 65 m., Oct.–Nov. 1917, *Montes & Salazar 10* (US); Ymala, 25 Sept.–8 Oct. 1891, *Palmer 1726* (G, US), same locality and date, *1729* (US); Hacienda Oso, *Partida*

2008 (US); Rosario, 21 June 1897, *Rose 1399* (US); vicinity of Topolobampo, 23 March 1910, *Rose, Standley & Russell 13256* (US, NY); vicinity of Mazatlan, April 1910, *Rose, Standley & Russell 13762* (G, US, M, F); mountains at headwaters of Mazatlan River, Feb. 1889, *W. G. Wright 1295* (US, M, F, UCal, D).

NAYARIT: without definite locality, 5 Jan.–6 Feb. 1892, *Palmer, without number,* (US); Acaponeta, 23 June 1897, *Rose 1448* (US); vicinity of Jalisco, 10 Nov. 1925, *Ferris 5888* (D); Ingenio, Santiago, 2 June 1849, *Gregg 1076* (M).

GUANAJUATO: without definite locality, coll. of 1880, *Duges, without number* (G); without definite locality, coll. of 1889, *Duges 77* (G, US); dry mountains, without definite locality, coll. of 1891, *Duges 77* (G).

JALISCO: near "Amatitlan," uplands west of Guadalajara, 24 May 1849, *Gregg 866* (M); La Barranca, Guadalajara, 16 Nov. 1930, *Jones 27384* (M, P); Tuxpan, Feb. 1904, *Purpus 498* (US, UCal, P).

VERA CRUZ: fields, Rio de Santa Maria, Zacuapan and vicinity, Nov. 1906, *Purpus 2259* (G, US, NY, M, F, UCal); La Fernera, *Purpus 8237* (UCal); Remudadero, Dec. 1922, *Purpus 8867* (UCal, D), same locality, March 1923, *Purpus 9023* (UCal); rocky places, Remudadero, April 1927, *Purpus 11052* (F); rocky soil, Remudadero, Nov. 1926, *Purpus 11059* (US, F); rocky thorn forests near Rancho Remudadero, March 1928, *Purpus 11155* (PhilAcad); same locality and date, *Purpus 11155a* (D); rocky places, Rancho Remudadero, April 1930, *Purpus 11165* (Cop).

QUERETARO: Toliman, Dec. 1840, *Ehrenberg, without number* (P); near Queretaro, 20–23 Aug. 1906, *J. N. & J. S. Rose 11172* (US); Queretaro, coll. of 1910–13, *Arsène 10436* (US).

HIDALGO: Ixmiquilpan, Aug. 1905, *Purpus, without number* (P); Zimapan, without date, *Coulter 1205* (K).

PUEBLA: Coxcatlan, Sept. 1909, *Purpus 4182* (G, US, NY, UCal).

MEXICO: San Siminito, Tejupilco, Distr. Temascaltepec, 28 March 1932, *Hinton 437* (K); Rincón de Aquirres, Tejupilco, Distr. Temascaltepec, alt. 1290 m., 29 May 1932, *Hinton 711* (K); hill, Ypericones, Distr. Temascaltepec, alt. about 1500 m., 17 Dec. 1932, *Hinton 2963* (M, K); Plaza de Gallos, Distr. Temascaltepec, alt. 1200 m., 21 Dec. 1932, *Hinton 2991* (K).

MORELOS: Cuernavaca, 15 Nov. 1865–66, *Bourgeau 1261* (G, K, Utrecht); San Anton, Cuernavaca, 14 Oct. 1904, *Seler 4189* (G, B).

MICHOACAN: Quinceo, vicinity of Morelia, alt. 2800 m., 11 Nov. 1909, *Arsène 3244* (US, M, B); Punguato, vicinity of Morelia, alt. 1950 m., 25 Aug. 1918, *Arsène 6702* (US, M); Hacienda Coahuayula, Feb. 1901, *Emrick 172* (F); La Piedad, without date, *Alcala, without number* (F), same locality, without date, *Arriaga, without number* (F).

COLIMA: without definite locality, 9 Jan.–6 Feb. 1891, *Palmer 1132* (G, US, NY).

GUERRERO: "I. R. F. Balsas," Coyuca, Distr. Coyuca, 25 Jan. 1934, *Hinton 5546* (M, K); "Cerro grande bei Chalapa," Nov. 1929, *Schultze 225* (B).

OAXACA: valley of Etla, Sept. 1895, *Alvarez 738* (G); "Cerro de la Soledad," 20 Nov. 1895, *Seler 1367* (G, NY, B); Monte Alban, near Oaxaca City, alt. about 1700 m., 27 Nov. 1894, *C. L. Smith 728* (NY, M); Oaxaca Valley, alt. 1600 m., 4 Oct. 1894, *C. L. Smith 734* (US).

CAMPECHE: without definite locality or date, *Chrismar, without number* (B).

YUCATAN: Izamal, coll. of 1888, *Gaumer, without number* (F); open lands about Izamal coll. of 1895, *Gaumer 398* (G, US, NY, M, Cop, F, CalAcad); San Anselmo, without date, *Gaumer 1740* (M, F); Temax, without date, *Gaumer 1741* (F); Pocoboch, without date, *Gaumer 2341* (US, M, F, P); Calotmul, without date, *Gaumer 2342* (F, Cop); Kancabconot, March 1917, *Gaumer & Sons 23592* (US, NY, M, B, Cop, F, UCal, CalAcad); Colonia San Cosme, 20 Feb. 1906, *Greenman 351* (G, F); top of mound, Calotmul, 1 Jan. 1932, *Lundell 1147* (F); edges of copses, Chal-tun-ha road near Izamal, 14 Jan. 1895, *Millspaugh 78* (US, F, CalAcad); Progresso, 5 March 1899, *Millspaugh 1683* (F); Merida, 11 Feb. 1903, *Seler 3824* (G, B, F); in clearing, Chichen Itza, 11 June 1932, *Steere 1219* (US); near Merida, coll. of 1896, *Valdez 70* (G, US, NY, M, F, UMich).

SALVADOR: Hacienda San Antonio, Dept. San Miguel, Jan. 1924, *Calderon 2113* (US).

COSTA RICA: dry thicket, Bebedero, Provincia Guanacaste, ''near sea level,'' 3 Feb. 1926, *Standley & Valerio 46694* (US).

This most widely distributed and abundant species is rather variable. The stem ranges from decumbent to erect. The bracts vary from ovate-lanceolate to lanceolate with a rather loose imbrication. The pubescence is generally of rather long and sparse hairs. The color of the corolla varies from white to deep yellow with occasional purplish spot-like markings.

17a. T. hispidum Nees var. **Greenmanii** Happ, n. var.[11]

Suffruticose plant, 1–2 dm. high; stems freely branched, branches slender; leaves lanceolate-ovate, acuminate, acute to somewhat mucronulate, acute to obtuse at the base; inflorescences more or less loosely spicate, spikes 1–7 cm. long; bracts lanceolate-oblong, 10–13 mm. long, about 3 mm. broad, conspicuously recurved, hispid on the outer surface, more noticeably so on the nerves, densely hispid-ciliate, the mucronate tip 0.5–0.8 mm. long; flowers creamy-white with striate purple lines; capsule about 5 mm. long, the constricted base 1 mm. long; seeds 4, 1.5 × 1.2 mm.

DISTRIBUTION: Nicaragua.

NICARAGUA: between Managua and Asososca, 24 Feb. 1922, *J. M. & M. T. Greenman 5627* (M TYPE); Managua, 14 Dec. 1925, *Chaves 44* (US).

The rather long, conspicuously recurved, densely ciliated bracts mark this variety.

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[11] **T. hispidum** Nees var. **Greenmanii** Happ, var. nov., herbacea perennis; spicis plus minusve laxis; bracteis lanceolato-oblongis, 10–13 mm. longis, apice et basi acuminatis, glanduloso-hispidulis et hispidis, apice recurvato; cetero simili speciei.—Collected between Managua and Asososca, Nicaragua, 24 Feb. 1922, *J. M. & M. T. Greenman 5627* (Mo. Bot. Gard. Herb., TYPE).

18. T. scabrum Torr. n. sp. in herb.[12]

Suffruticose plant, 1–2 dm. high; stems freely branched, branches slender, at first evenly glandular-hispid, later pubescent in lines, more or less glabrate; leaves lanceolate to lanceolate-ovate, 1–2 cm. long, 0.4–0.8 cm. broad, closely glandular-hispidulous on both surfaces intermixed with scattered hispid hairs, more conspicuously so on the midrib and nerves, sparsely hispid-ciliate; petioles 1–3 mm. long, pubescent; inflorescences more or less loosely spicate, spikes 1–4 cm. long, internodes usually 1 mm. long; bracts lanceolate-linear, 7–8 mm. long, about 2 mm. broad, obtusish at the apex, mucronate, usually erect, long-cuneate at the base, densely glandular-puberulent intermixed with comparatively short, scattered hispid hairs, more conspicuously so on the nerves, closely ciliate, hairs about 1 mm. long; bracteoles 2, linear-lanceolate, 4–5 mm. long, glandular-puberulent, hispid-ciliate; calyx-lobes 4, linear-lanceolate, 3 mm. long, puberulent, ciliate; capsule about 4 mm. long, 2 mm. broad, puberulent near the apex, the constricted base 1 mm. long; seeds 4, 1.2 × 1 mm.

DISTRIBUTION: northern Mexico.

SONORA: gravelly hills, Fronteras, June 1851, *Thurber 432* (G, NY TYPE, M photo).

SAN LUIS POTOSI: without definite locality, coll. of 1871, *Virlet d'Aoust 810* (Cop).

This pronouncedly decumbent plant shows close affinities with *T. hispidum* in its general characters, but the lanceolate-linear bracts and glandular-hirtellous puberulence, together with its decumbent habit, mark it quite definitely as a distinct species.

19. T. glandulosum Oersted in Kjoeb. Vidensk. Meddel. 171. 1854; Hemsl. Biol. Centr.-Am. Bot. **2**: 526. 1882.

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[12] **T. scabrum Torr.**, sp. nov., herbacea perennis; caulibus et ramis gracilibus, glanduloso-hispidis vel glabris; foliis lanceolatis vel lanceolato-ovatis, 1–2 cm. longis, 0.4–0.8 mm. latis, utrinque dense glanduloso-hispidulis, hispidis vel glabris; bracteis lanceolato-linearibus, 7–8 mm. longis, cuneatis, apice obtuso, basi acuto vel obtuso, dense glanduloso-hispidulis et sparse hispidis, mucrone erecto; bracteolis 2; calyce 4-partito.—Collected on gravelly hills, Fronteras, Sonora, Mexico, June 1851, *Thurber 432* (N. Y. Bot. Gard. Herb., TYPE).

Stems freely branched, branches stoutish, at first evenly and densely simple-pilose intermixed with shorter stipitate-glandular hairs, later pubescent in lines, or glabrous; leaves lanceolate-ovate to oblong-ovate, 1–8 cm. long, 0.3–5 cm. broad, acuminate, mucronulate to acute, obtuse to subcordate at the base, scattered-pilose, conspicuously so on the midrib and nerves on both surfaces; petioles 0.3–3.5 cm. long, pilose intermixed with short stipitate-glandular hairs; inflorescences more or less loosely spicate, spikes 1–5 cm. long; bracts oblong-linear to oblong-lanceolate, 7–9 mm. long, 1–2 mm. broad, obtuse to rounded at the apex, mucronate, closely glandular-puberulent intermixed with scattered pilose hairs, densely ciliate; bracteoles 2, linear, 5–6 mm. long, glandular-pubescent; calyx-lobes 5, linear-lanceolate, 3–4 mm. long, glandular-pubescent; corolla 21–23 mm. long, middle lobe of the anterior lip obovate-oblong, 12 mm. long, 6 mm. broad, slightly concave, lateral lobes obovate-oblong, 13 mm. long, 5 mm. broad, posterior lip oblong-obovate, about 11 mm. long, 4 mm. broad, subemarginate; pollen-grains about 37 × 25 μ; capsules and seeds not seen.

DISTRIBUTION: southern Mexico.

OAXACA: Amoloyas, 25 Dec. 1906, *Conzatti 1663* (F); Cuicatlan, alt. 500 m., 2 Dec. 1897, *Conzatti & Gongalez 645* (G); dry land near Lake Chapala, coll. of 1900, *Junvier, without number* (US); "Rio de las Vueltas," Dec. 1842, *Liebmann 10751* (B, Cop TYPE, F photo, M photo); Tomellin Cañon, alt. 900 m., 17 May 1894, *Pringle 5852* (G, Cop); same locality, alt. 1000 m., 30 Nov. 1895, *Pringle 6174* (G, US, NY, M, F, PhilAcad, CalAcad); below Jayacatlan, alt. 1000 m., 9 Feb. 1895, *L. C. Smith 355* (G).

The broad leaves and linear-ovate bracts with rather hirsute pubescence mark this species.

20. T. aureum Rose in Contrib. U. S. Nat. Herb. **1**: 349. 1895.
Pl. 33, fig. 4.

Plant 6–9 dm. high; stems freely branched, branches stoutish, at first evenly and densely glandular-pubescent, later glandular-hirsute in lines, glabrate; leaves lanceolate-linear to oblong-ovate, 1–8 cm. long, 0.2–3 cm. broad, long-acuminate, obtuse to acute, mucronulate, scattered-pilose on both surfaces, more closely so on the midrib and nerves, ciliate, later less conspicuously so; petioles 0.2–3 cm. long, glandular-pubescent; inflorescences more or less loosely spicate, spikes 1–4 cm. long, internodes usually 3 mm. long; flowers yellow; bracts linear-oblong to lanceolate-oblong, 7–8 mm. long, 0.8–1.5 mm. broad, acute to rounded at the apex, sometimes mucronate, densely glandular-puberulent intermixed with longer multicellular-glandular hairs; bracteoles 2, linear-oblong, 7–9 mm. long, 0.6–1 mm. broad, similarly pubescent; calyx-lobes 5, linear, 4–5 mm. long, glandular-pubescent; corolla 21–23 mm. long, middle lobe of the anterior lip obovate-oblong, 12 mm. long, 6 mm. broad, lateral lobes obovate-oblong, 13 mm. long, 5 mm. broad, posterior lip obovate-oblong, about 11 mm. long, 4 mm. broad, subemarginate; pollen-grains about 37 × 22 μ; capsule 7 mm. long, 2.5 mm. broad, glabrous, the constricted base 3 mm. long; seeds 4, 2.4 × 1.8 mm.

DISTRIBUTION: Mexico.

CHIHUAHUA: without definite locality, coll. of 1892, *Hartman 1013* (G).

SINALOA: road from Las Flechas to La Rostra, 22 Feb. 1899, *Goldman 321* (US); Balboa, coll. of 1923, *Ortega 5126* (US); Mazatlan, coll. of 1925, *Ortega 5660* (US).

COLIMA: without definite locality, 9 Jan.–6 Feb. 1891, *Palmer 1302* (G, US TYPE, NY, M photo).

PUEBLA: mountains near Tehuacan, Jan. 1902, *Purpus 462* (US, M, P).

This species, found largely in northern and central Mexico, differs from its near relative, *T. glandulosum,* in having more lanceolate leaves, narrower linear bracts, and more densely glandular pubescence with few hirsute hairs intermixed.

21. T. diffusum Rose in Contrib. U. S. Nat. Herb. **1**: 349. 1895.

Stems freely branched; branches slender, at first evenly and minutely glandular-puberulent, later puberulent in lines, or glabrous; leaves lanceolate to lanceolate-ovate, 0.3–2 cm. long, 0.1–1 cm. broad, inconspicuously glandular-puberulent to glabrous on both surfaces; petioles 0.1–6 mm. long, glandular-puberulent; inflorescences loosely spicate, spikes 1–6 cm. long, internodes usually 5 mm. long; bracts lanceolate-oblong, 3–5 mm. long, 0.6–1 mm. broad, obtusish, mucronulate, cuneate below the middle, gradually narrowed to a subpetiolate base, minutely glandular-puberulent; bracteoles 2, linear-lanceolate, 2.5–4 mm. long, obtusish, mucronulate, puberulent; calyx-lobes

5, filiform, about 2 mm. long, puberulent; corolla 10–11 mm. long, middle lobe of the anterior lip obovate, 6.5 mm. long, 2 mm. broad, lateral lobes oblanceolate-obovate, 7 mm. long, 2 mm. broad, posterior lip oblong-obovate, 7 mm. long, 2 mm. broad, slightly emarginate; pollen-grains about 20 × 15 μ; capsules 5 mm. long, 1.5 mm. broad, puberulent near the apex, the constricted base 1.8 mm. long; seeds 2, 1 × 0.8 mm.

DISTRIBUTION: southwestern Mexico.

COLIMA: Manzanillo, 1–31 Dec. 1890, *Palmer 994* (G, US TYPE, NY, M photo); on cliffs along ocean, west of Cuyutlan Lagoon, vicinity of Manzanillo, 30 Nov. 1925, *Ferris 6178* (D).

The slender stems, small leaves, loose inflorescence, and very slender linear bracts are distinctive characters of this species.

Section II. TORREYELLA, n. sect. Leaves linear to elliptic-lanceolate. Bracts lanceolate to cordate. Calyx-lobes 5. Corolla-tube two-thirds the total length of corolla. Stamens inserted on median or lateral lobes of anterior lip of corolla. Pollen-grains spherical to ellipsoid. Capsule flattened laterally or terete; seeds 2 or 4, 2–3.2 × 1.5–3 mm. Species 22–23 incl.

KEY TO THE SPECIES

A. Stamens inserted on lateral lobes of anterior lip; capsule flattened laterally; seeds two .... *22. T. platystegium*

AA. Stamens inserted on middle lobe of anterior lip; capsule terete; seeds four .... *23. T. rubrum*

22. T. platystegium Torr. in Bot. U. S. & Mex. Bound. Surv. **2**: 126. 1859; A. Gray, Syn. Fl. N. Amer. **2**^{1}: 331. 1878; Coult. in Contrib. U. S. Nat Herb. **2**: 325. 1896. Pls. 29 and 33.

Stems freely branched, slender, at first evenly short-hispid-pubescent, later pubescent in lines, or glabrous; leaves elliptic-lanceolate to elliptic-linear, 1–5 cm. long, 0.2–1.2 cm. broad, acutish to obtuse, acute to cuneate at the base, sparsely hispid to glabrous on both surfaces, more conspicuously so on the midrib and nerves; petioles 1–5 mm. long, hispid to glabrous; inflorescences more or less loosely imbricated, spikes 1–4 cm. long, internodes 3–5 mm. long; bracts ovate, acute, cordate at the base, 1–2 cm. long, 0.8–1.5 cm. broad, inconspicuously hispidulous sparingly intermixed with minute gland-tipped hairs, erect, mucronate; calyx-lobes 5, lanceolate, 2–3 mm. long, hispidulous; corolla 1.8–2.5 cm. long, tube 1.3–1.8 mm. long, middle lobe of the anterior lip elliptic-ovate, 6–7 mm. long, about 3 mm. broad, lateral lobes elliptic-ovate, 6–7 mm. long, 3 mm. broad, posterior lip elliptic-ovate, 6–7 mm. long, 2–2.5 mm. broad, emarginate, stigma exserted; pollen-grains 38 × 38 μ; capsule 8 mm. long, 4 mm. broad, the constricted base 2 mm. long; seeds 2, muriculate, 3.2 × 3 mm.

DISTRIBUTION: southwestern United States and northeastern Mexico.

UNITED STATES.

TEXAS: steep shaded rocky hillsides, Montell, Uvalde Co., 22 June 1917, *Palmer 12326* (M, CalAcad); Ringgold Barracks near Rio Grande City, on the lower Rio Grande, 30 May 1853, *Schott, without number* (type material NY, and F, M photo).

MEXICO.

TAMAULIPAS: Cerro de la Tamaulipeca, vicinity of San Miguel, alt. about 600 m., 24 July 1930, *Bartlett 10557* (F); "Buena Vista Hda.," 18 June 1919, *Wooton, without number* (US).

NUEVO LEON: Monterey, coll. of 1924, *Orcutt, without number* (US).

COAHUILA: Caracol Mts., 21 miles southeast of Monclova, Aug. 1880, *Palmer 1004* (G, US, K).

This species is quite distinct from any other species in this genus known to the writer. The large cordate bracts and the long tubular corolla, together with the shorter filaments exserted from the lateral lobes of the anterior lip, are distinctive characters of this species.

23. T. rubrum Happ, n. sp.[13]

Plant about 1 m. high; stems freely branched, slender, at first evenly glandular-hispid sparsely intermixed with long simple hairs, later somewhat pubescent in lines, more or less glabrous; leaves lanceolate, 2–3 cm. long, 3–6 mm. broad, acutish at both ends, densely glandular-hispidulous sparsely intermixed with longer simple hairs on both surfaces; petioles 3–5 mm. long, pubescent; inflorescences closely imbricated, spikes 2–5 cm. long; bracts lanceolate-linear, 1–2 cm. long, acuminate at the apex, acute at the base, densely glandular-hispid intermixed with long simple hairs, conspicuously recurved, mucronate; bracteoles 2, lanceolate-linear, 8–10 mm. long, about 1 mm. broad, densely glandular-pubescent; calyx-lobes 5, filiform, about 5 mm. long, glandular-puberulent; corolla 3 cm. long, red, tube 1.9 cm. long, middle lobe of the anterior lip oblong-obovate, about 1 cm. long, 3 mm. broad, lateral lobes oblong-obovate, about 1 cm. long, 4 mm. broad, posterior lip oblong-obovate, about 1 cm. long, 4 mm. broad, subemarginate; filaments inserted on the middle lobe of the anterior lip; pollen grains 40 × 25 μ; capsule 8–10 mm. long, 3–3.5 mm. broad, the constricted base about 3 mm. long, glabrous; seeds 4, 1.5 × 2 mm., muriculate.

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[13] **T. rubrum** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-hispidis vel glabratis; foliis lanceolatis, 2–3 cm. longis, 3–6 mm. latis, apice et basi acutis, dense glanduloso-hispidulis et parce hispidis; inflorescentiis densis, spicis 2–5 cm. longis; bracteis lanceolato-linearibus, 1–2 cm. longis, apice acuminato, recurvato; basi acuto, dense glanduloso-hispidis; bracteolis 2; calyce 5-partito; corolla 3 cm. longa, rubra, tubo 1.9 cm. longo.—Collected on dry hill, Nanchititla, Distr. Temascaltepec, Mexico, 11 April 1933, *Hinton 3767* (Herb. Roy. Bot. Gard., Kew, TYPE).

DISTRIBUTION: central Mexico.

MEXICO: dry hill, Nanchititla, Distr. Temascaltepec, 11 April 1933, *Hinton 3767* (K TYPE, M, M photo).

This species is readily distinguished by the long tube and striking reddish coloration of the corolla.

GENUS AND SPECIES EXCLUDED

Tetramerium Gaertn. f. Fruct. et Sem. **3**: 90, *pl. 196.* 1805 = FARAMEA Aubl. Pl. Guin. p. 102, *pl. 40.* 1775, in part; COFFEA L. Syst. ed. 1. 172. 1735, in part.

T. coeruleum Nees ex Mart. in Nov. Act. Nat. Cur. **12**[1]: 13. 1824 = FARAMEA CAERULEA DC. Prodr. **4**: 497. 1830.

T. flavum Eastwood, in Proc. Amer. Acad. **44**: 608. 1909 = HENRYA **flava** (Eastwood) Happ.

T. geniculatum Brandeg. in Univ. Calif. Publ. Bot. **4**: 386. 1913, is not of this genus; material is insufficient to permit further determination.

T. gualanense Robinson & Bartlett in Proc. Amer. Acad. **63**: 58. 1907 = HENRYA **gualanensis** (Robins. & Bartl.) Happ.

T. jasminoides HBK. Nov. Gen. et Sp. **3**: 373, *pl. 287.* 1818 = FARAMEA JASMINOIDES DC. Prodr. **4**: 497. 1830.

T. latifolium Cham. & Schlecht. in Linnaea **4**: 30. 1829 = FARAMEA LATIFOLIA DC. Prodr. **4**: 497. 1830.

T. montevidense Cham. & Schlecht. in Linnaea **4**: 29. 1829 = FARAMEA MONTEVIDENSIS DC. Prodr. **4**: 497. 1830.

T. multiflorum Bartling ex DC. Prodr. **4**: 497. 1830 = FARAMEA GUAYAQUILENSIS DC. Prodr. **4**: 497. 1830.

T. occidentale Nees ex Mart. in Nov. Act. Nat. Cur. **12**^{1}: 13. 1824 = FARAMEA ODORATISSIMA DC. Prodr. **4**: 496. 1830.

T. odoratissimum Gaertn. f. Fruct. et Sem. **3**: 196. 1805 = FARAMEA ODORATISSIMA DC. Prodr. **4**: 496. 1830.

T. oleaefolium Spreng. Syst. **1**: 409. 1825 = COFFEA OLEIFOLIA HBK. Nov. Gen. et Sp. **3**: 372. 1818.

T. paniculatum Spreng. Syst. **1**: 409. 1825 = COFFEA PANICULATA Aubl. Pl. Guin. **1**: 152, *pl. 58.* 1775.

T. racemulosum Nees in Benth. Bot. Voy. Sulphur, p. 148. 1844 = JUSTICEA RACEMULOSA Wikstr. in Vet. Akad. Handl. Stockh. p. 426. 1825.

T. scorpioides (Nees) Hemsl. Biol. Centr.-Am. Bot. **2**: 525. 1882 = HENRYA SCORPIOIDES Nees in DC. Prodr. **11**: 464. 1848.

T. sessilifolium HBK. Nov. Gen. & Sp. **3**: 374. 1818 = FARAMEA SESSILIFOLIA DC. Prodr. **4**: 497. 1830.

T. stipulaceum Cham. & Schlecht. in Linnaea **4**: 31. 1829 = FARAMEA STIPULACEA DC. Prodr. **4**: 497. 1830.

By petition to the International Botanical Congress in 1935, it has been recommended by the Committee on Nomenclature that TETRAMERIUM Nees be placed in the list of conserved genera.

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The number of the collector is in *italics.* If the collection is unnumbered, this is indicated by a dash. The numbers in parentheses indicate the number designated to the species in this revision.

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HENRYA

GENERAL MORPHOLOGY

Roots.—The root system is typical of suffrutescent plants and presents no unusual characters of morphological significance.

Stems.—The stems are erect, ascending, or even pendant, one to several at the base, freely branched, slender, terete to acutely four-angled in cross-section, and occasionally with wings at the angles. The stem may be pubescent or glabrous, and frequently the bark exfoliates in the later stages.

Leaves.—The leaves are opposite, petiolate, ovate to linear, pubescent to glabrous, frequently more conspicuously pubescent on the midrib and nerves. The primary leaves usually are early deciduous. Length of the petiole, outline of leaf, pubescence, and venation are relatively constant for the species and therefore furnish fairly good characters for specific diagnosis.

Bracts.—There are two types of bracts, the outer or cauline and the inner or involucral. The cauline bracts are lanceolate-ovate to lanceolate, and usually much shorter than the involucral bracts. The two involucral bracts, obovate to lanceolate, acuminate to rounded at the apex, are united along the posterior margin from the base to near the apex. The erect or recurved mucro is located directly on or below the apical margin of these bracts. This mucro proves to be a distinctive morphological character often giving substantial supporting evidence for specific differentiation.

Calyx.—The calyx is five-lobed, filiform to lanceolate, and quite diminutive.

Pubescence.—The pubescence is from pilose to hirsute or glandular and is variously intermixed in certain species. On the stems, the pubescence is at first evenly distributed and later disposed in alternating lines on the internodes. On the leaves, the pubescence is frequently more conspicuous on the midrib and nerves. The bracts also frequently bear a more pronounced pubescence on the veins.

Inflorescence.—The spicate inflorescence is terminal and axillary. The spikes, one to several at the nodes, are loosely to closely imbricated. The opposite flowers are subtended by the partially coalesced involucral bracts.

Corolla.—The corolla is tubular-infundibuliform and conforms in general to that of *Tetramerium,* from which it differs in having a corolla-tube proportionately shorter, about one-third the total length.

Stamens.—The stamens are two and project beyond the corolla. In other characters they conform in general to those of *Tetramerium.*

Fruit.—The capsule is constricted at the base for about half the total length. The surface near the apex is usually glabrous. The two disciform seeds are hispid on one surface and glabrate on the other.

GEOGRAPHICAL DISTRIBUTION AND INTERSPECIFIC RELATIONSHIPS

As treated in this study, the genus *Henrya* consists of twenty species and one variety. The geographical range of this genus extends from the northern states of Mexico southwest to the state of Veraguas in Panama. The center of geographical distribution, as well as the relative abundance of individuals, appears to be located in west-central Mexico. Relatively low altitudes and xerophytic habitats characterize on the whole the environments of these plants.

The following chart portrays the interspecific relationships within the genus.

GENERIC RELATIONSHIPS

The genus *Henrya* shows its closest relationship to *Tetramerium* particularly in habit, stem- and leaf-characters. However, in inflorescence, coalescence of involucral bracts, shorter corolla-tube, broader corolla-lip and corolla-lobes, more linear and obtuse style branches, exserted style and stamens, more oblong pollen-grain, two instead of four ovules, mostly gla-

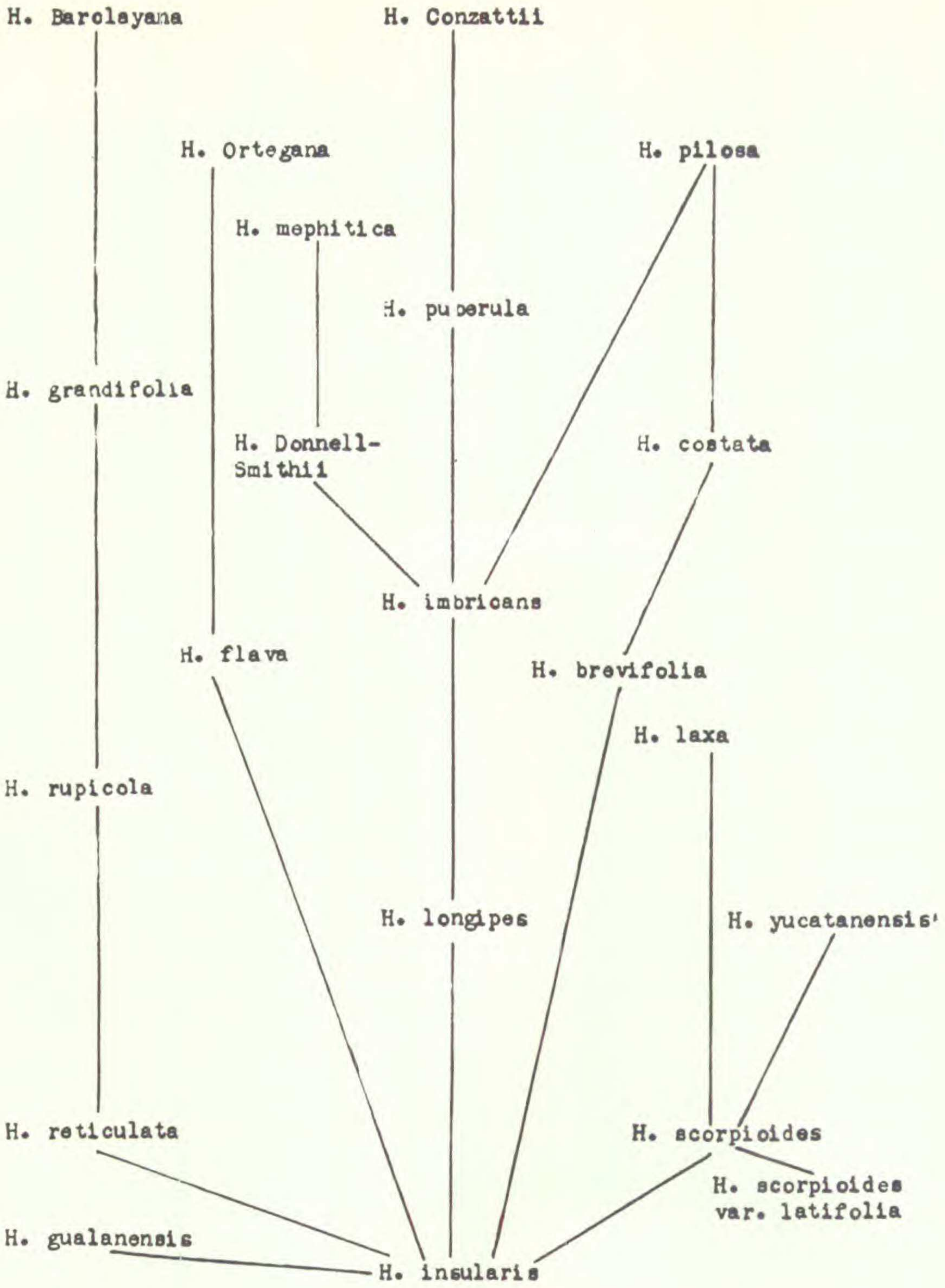

Fig. 2. Diagram to show interspecific relationships of *Henrya.*

brous capsule with a longer constricted, sterile base, obtuse retinacula, and seeds with a hispid surface, *Henrya* stands out in marked contrast, and is well worthy of generic recognition.

In considering other possible relationships in the Acanthaceae, it should be mentioned that the presence of two conspicuous but uncoalesced bracts in some species of the genus *Dicliptera,* possibly comparable to the twin bracts in *Henrya,* may indicate an affinity between these two genera.

TAXONOMY

Henrya Nees acc. to Benth. Bot. Voy. Sulphur, p. 148, *pl.* 49. 1844; Nees in DC. Prodr. **11**: 491. 1847.

Tetramerium Nees Benth. & Hook. Gen. Pl. **2**: 1121. 1876, in part; Lindau in Engler & Prantl, Nat. Pflanzenfam. IV, Abt. 3b. p. 331. 1895, in part.

Fruticose to suffruticose perennials. Roots fibrous. Stems erect, spreading, or decumbent; branches opposite, sometimes terete, frequently 4-angled in cross-section, occasionally conspicuously winged along the angles, at first evenly pubescent, or pubescence disposed in lines, sometimes bearing exfoliating bark. Leaves opposite, entire, rotund-ovate to linear, pubescent to glabrous on both surfaces. Inflorescences terminal and axillary, spicate, loosely or closely imbricated. Cauline bracts solitary, lanceolate-ovate to linear, pubescent to glabrate. Flowers solitary, sessile or short-pedicellate, subtended by involucral bracts which are coalescent from base nearly to apex on posterior side, pubescent to glabrous, mucronate at or near the apex. Calyx-lobes 5, lanceolate-ovate to filiform, pubescent or glabrous. Corolla tubular-infundibuliform, bilabiate, tube straight to slightly curved, slightly enlarged near the base, about one-third the length of the corolla, anterior lip three-lobed, obovate-oblong, posterior lip obovate-oblong, all lobes nearly equal. Stamens 2, exserted, extending beyond corolla-lip; anthers consisting of 2 nearly parallel, oblong obtuse sporangia. Pollen-grains oblong, about twice as long as broad, pores equatorial, surface scrobiculate. Ovary narrowly obovate, base obtuse, retinacula curved, obtuse. Ovules 2, disciform, surface hispid. Capsule obovate, apiculate, lower half to base compressed, usually glabrous. Seeds 2, disciform, hispid.

Type species: *Henrya insularis* Nees in Benth. Bot. Voy. Sulphur, p. 148, *pl. 49.* 1844.

KEY TO THE SPECIES

A. Mucro situated directly on the apical margin of the involucral bract, usually erect.

B. Subtending bracts of the inflorescences shorter than the involucral bracts.

C. Involucral bracts usually 6–9 mm. long.

D. Internodes of the spike usually longer than the involucral bracts.

E. Leaves ovate to lanceolate..........................*1. H. insularis*

EE. Leaves ovate to obovate.

F. Leaves usually 3–5-nerved on either side of the midrib; petioles mostly hirsute and glandular..................*2. H. brevifolia*

FF. Leaves usually 4–8-nerved on either side of the midrib; petioles mostly hirsute, not glandular....................*3. H. costata*

DD. Internodes of the spike usually shorter than the involucral bracts ....*4. H. longipes*

CC. Involucral bracts usually 10–13 mm. long.

G. Stem usually acutely 4-angled.

H. Lateral veins of the leaf close; bracts of the inflorescences mostly 5–7 mm. long.......................................*5. H. flava*

HH. Lateral veins of the leaf remote; bracts of the inflorescence mostly 3–5 mm. long.......................*6. H. yucatanensis*

GG. Stems terete or nearly so............................*7. H. Ortegana*

BB. Subtending bracts of the inflorescence usually longer than the involucral bracts.......................................*8. H. gualanensis*

AA. Mucro situated more or less below the apical margin of the involucral bract, sometimes recurved.

I. Bracts of the involucre acuminate, acute at the apex.

J. Involucral bracts conspicuously pubescent.

K. Involucral bracts mostly 3–8 mm. long.

L. Involucral bracts chiefly hirsute or flaccid-hirsute pubescent, intermixed with gland-tipped hairs.

M. Involucral bracts short, hirsute-pubescent.

N. Leaves ovate to ovate-lanceolate..............*9. H. scorpioides*

NN. Leaves ovate to ovate-rotund....*9a. H. scorpioides* var. *latifolia*

MM. Involucral bracts long, pilose-pubescent............*10. H. pilosa*

LL. Involucral bracts chiefly glandular-pubescent............*11. H. laxa*

KK. Involucral bracts mostly 9–11 mm. long.............*12. H. imbricans*

JJ. Involucral bracts puberulent or glabrous.

O. Involucral bracts puberulent; cystoliths not apparent...*13. H. puberula*

OO. Involucral bracts glabrous; cystoliths apparent........*14. H. Conzattii*

II. Bracts of the involucre obtuse to rounded at the apex.

P. Primary leaf-blade much longer than broad.

Q. Leaves large, mostly 7–13 cm. long; spikes rather loose.......... ....*15. H. grandifolia*

QQ. Leaves small, 1.5–6 cm. long; spikes rather dense.
  R. Involucral bracts 8–12 mm. long.
    S. Young leaves glandular-pubescent on both surfaces.......... ....16. *H. Barclayana*
    SS. Young leaves more or less puberulent on both surfaces........ ....17. *H. mephitica*
  RR. Involucral bracts 5–8 mm. long.
    T. Involucral bracts densely glandular-hirsute, mucro near the apical margin........................18. *H. Donnell-Smithii*
    TT. Involucral bracts hirsute with scattered gland-tipped hairs, mucro remote from the apical margin...........19. *H. rupicola*
PP. Primary leaf-blade nearly as long as broad............20. *H. reticulata*

1. **H. insularis** Nees in Benth. Bot. Voy. Sulphur, p. 148, *pl. 49*. 1844. Pl. 33, figs. 6 & 11.

H. scorpioides Nees in DC. Prodr. **11**: 491. 1847, in part.

Tetramerium scorpioides (Nees) Hemsl. Biol. Cent.-Am. Bot. **2**: 526. 1882, in part.

Henrya costata A. Gray var. *glandulosa* T. S. Brandeg. in Zoe **5**: 171. 1903.

Stems freely branched, at first evenly glandular-pilose, later pubescent in lines, or glabrous; leaves ovate, 1–5.5 cm. long, 0.5–2.5 cm. broad, obtusish to cuspidate at the apex, obtuse at the base, usually 3–8-nerved on either side of the midrib, at first glandular-pilose, later sparsely appressed-pilose on both surfaces, more conspicuously so on the midrib and nerves; petiole 0.1–2.5 cm. long, glandular-pilose to glabrous; spikes 1–10 cm. long, rather loose; cauline bracts oblanceolate, 2–3 mm. long, mucronulate, glandular-pilose; involucral bracts oblanceolate, 7–9 mm. long, about 2 mm. broad, acute, glandular-pilose, mucro directly on the apical margin, erect, 0.4 mm. long; calyx-lobes lanceolate-linear, 0.8–1 mm. long, glandular-puberulent; corolla 10 mm. long, middle lobe of the anterior lip oblong-obovate, 4.2 mm. long, 2 mm. broad, lateral lobes obovate-oblong, 4.2 mm. long, 2 mm. broad, posterior lip oblong-obovate, 4.2 mm. long, about 1 mm. broad, acutish at the apex, subemarginate; pollen-grains about 45 × 25 μ; capsule 7 mm. long, 1.8 mm. broad, glabrous, the constricted base 3.5 mm. long; seeds 2.5 × 1.9 mm.

DISTRIBUTION: western Mexico and Central America including Panama.

MEXICO.

LOWER CALIFORNIA: Sierra de la Laguna, 26 Jan. 1890, *Brandegee, without number* (G, PhilAcad, UCal); Santa Anita, Cape Region, Jan.–March 1901, *Purpus 266* (US, M, UCal).

SINALOA: "San Vicente," Balboa, 1923, *Ortega 5128* (US); Mazatlan, 1925, *Ortega 5699* (US); vicinity of Mazatlan, April 1910, *Rose, Standley & Russell 13845* (US, F).

NAYARIT: La Barranca, 21 Feb. 1927, *Jones 23188* (M, UCal, P).

JALISCO: without definite locality or date, specimen collected presumably by *Lay & Collie* during the voyage of Captain Beechey to the "Pacific and Bering's Strait," 1825–1828, in part (K).

MEXICO: hill, Nanchititla, Distr. Temascaltepec, 18 Jan. 1933, *Hinton 3410* (K).

PANAMA: island off Veraguas, without date, *Sinclair, without number* (K TYPE, M photo).

The distribution of this species is largely on the Pacific slope of Mexico and Central America. The involucral bracts tend to become slightly shorter and the plant as a whole is somewhat more glandular in the northern parts of its range. It is chiefly distinguished by the rather loose inflorescence and by the mucro, usually erect, situated directly on and continuous with the apical margin of the acuminate-apiculate involucral bracts, which are also relatively long.

2. **H. brevifolia** Happ, n. sp.[14]

Stems freely branched, at first evenly glandular-pilose, later pubescent in lines, or glabrous; leaves obovate to ovate, 0.5–5 cm. long, 0.5–1.5 cm. broad, rounded to cuspidate at the apex, rounded to obtuse at the base, usually 3–5-nerved on either side of the midrib, at first glandular-pilose, later sparsely pilose on both surfaces, more conspicuously so on the midrib and nerves; petiole 0.1–0.5 cm. long, glandular-pilose to glabrous; spikes 1–12 cm. long, rather loose; cauline bracts oblanceolate, 3–5 mm. long, mucronulate, glandular-hispid; involucral bracts oblanceolate, usually 6–8 mm. long, about 2 mm. broad, acute, glandular-hispid intermixed with occasional long simple hairs, mucro directly on the apical margin, erect, 0.3 mm. long, calyx-lobes lanceolate-linear, 0.8 mm. long, glandular-puberulent; corolla 10–12 mm. long, middle lobe of the anterior lip obovate, 7–8 mm. long, about 4 mm. broad, lateral lobes obovate-oblong, about 7 mm. long, 3 mm. broad, posterior lip oblong-obovate, about 7 mm. long, 2.5 mm. broad, emarginate; pollen grains 45 × 25 μ; capsule 6 mm. long, 1.5 mm. broad, slightly puberulent near the apex, constricted base 3 mm. long; seeds 2.3 × 1.8 mm.

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[14] **H. brevifolia** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-pilosis vel glabratis; foliis ovatis vel obovatis, 0.5–5 cm. longis, 0.5–1.5 cm. latis, apice rotundato vel cuspidato, basi rotundato vel obtuso, utrinque ex medio nervo 3–5 nervis, glanduloso-pilosis vel glabratis; petiolis 0.1–0.5 cm. longis; spicis 1–12 cm. longis, plus minusve laxis; caulis bracteis oblanceolatis, 3–5 mm. longis; involucri bracteis oblanceolatis, 6–8 mm. longis, glanduloso-hispidis, mucrone ad apicem bracteae posito; corolla 10–12 mm. longa.—Collected at Las Duvasvillas, Sonora, Mexico, 18 May 1892, *Brandegee, without number* (Univ. Cal. Herb., TYPE).

DISTRIBUTION: northwestern Mexico.

SONORA: Las Duvasvillas, 18 May 1892, *Brandegee, without number* (G, US, NY, M photo, PhilAcad, UCal TYPE, D); Sierra de Alamos, 14 March 1910, *Rose, Standley & Russell 12829* (US).

This species is distinctive because of the prevalence of the small obovate leaves with three to five nerves and with rather broad intervals between them on either side of the midrib. In nervation and in glandular-pubescence it rather tends towards *H. insularis,* and in the shape of the leaves, habit, and general appearance, it resembles *H. costata.* However, it differs from these two species in important morphological characters and has a distinct area of distribution.

3. **H. costata** A. Gray in Proc. Amer. Acad. **21**: 406. 1886.

Tetramerium costatum Millsp. in Field Mus. Bot. Ser. **1**: 47, 320. 1895–96.

Stems freely branched, pendant, slender, at first evenly pilose and inconspicuously intermixed with gland-tipped hairs, later pubescent in lines, or glabrous; leaves ovate to rotund-ovate, 0.5–4.5 cm. long, 0.3–3 cm. broad, abruptly acuminate, mucronate, obtuse to truncate at the base, with usually 4–8 nerves, rather close, curved toward the apex, on either side of the midrib, pilose beneath, sparsely pilose above, more conspicuously so on the midrib and nerves; petioles 0.5–1.5 mm. long, at first densely pubescent, later sparsely so; spikes 1–10 cm. long, rather loose, internodes usually 7–10 mm. long; flowers "straw-color"; cauline bracts oblanceolate, 3–4 mm. long, pilose and inconspicuously intermixed with gland-tipped hairs; involucral bracts oblanceolate, 8–9 mm. long, about 4 mm. broad, acute, pubescent as above, mucro about 0.5 mm.

long, erect, directly on the apical margin; calyx-lobes lanceolate-linear, 1 mm. long, pilose-puberulent; corolla about 11 mm. long, middle lobe of the anterior lip obovate, 7 mm. long, 4 mm. broad, lateral lobes obovate-oblong, 7 mm. long, 2.5 mm. broad, posterior lip oblong-obovate, 7 mm. long, 1.5 mm. broad, subemarginate; pollen-grains about 40 × 24 μ.

DISTRIBUTION: northern Mexico.

CHIHUAHUA: pendant from precipitous rocks, near Batopilas, Aug.–Nov. 1885, *Palmer 211* (G TYPE, US, M photo, PhilAcad).

This has been perhaps the most frequently misinterpreted member of this genus, and much material has been incorrectly named. It is at present known from one collection only, namely, Dr. Edward J. Palmer's collection from southwestern Chihuahua. As described by Dr. A. Gray, the five to seven nerves on either side of the midrib have been apparently the basis for some misinterpretation. The delimitation as now given indicates that the close-costate condition, particularly at the base of the leaves continuing curvinerved and somewhat parallel to the margin towards the apex, together with the broad ovate to elliptical outline and comparatively small size of the leaves, is characteristic of the species. In general the pubescence is simple-pilose intermixed with a few gland-tipped hairs principally on the surface of the involucral bracts. The mucro is distinctly erect and continuous with apical margin.

4. **H. longipes** Happ, n. sp.[15]

Stems freely branched, at first hirsute-pubescent intermixed with gland-tipped hairs, later pubescent in lines, or glabrous; leaves ovate to lanceolate, 0.5–8 cm. long, 0.2–3 cm. broad, acute to acuminate at the apex and at the base, mostly 3–5-nerved on either side of the midrib, at first pilose-pubescent on both surfaces, later somewhat glabrate; petiole 0.2–4.5 cm. long; spikes dense, terminal and lateral, 2–8 cm. long, 2 to 4 at the cauline nodes, internodes 0.2–1 cm. long; cauline bracts oblanceolate, 3–5 mm. long, acuminate-mucronate, hirsute-pubescent intermixed with gland-tipped hairs; involucral bracts oblanceolate, usually 7–8 mm. long, rounded, hirsute-pubescent intermixed with gland-tipped hairs, mucro directly on the apical margin, erect, inconspicuous, 0.1–0.2 mm. long; calyx-lobes lanceolate-linear, 0.7 mm. long, puberulent; corolla 10–12 mm. long, middle lobe of the anterior lip obovate, 7 mm. long, 3 mm. broad, lateral lobes obovate-oblong, about 7 mm. long, 2.5 mm. broad, posterior lip oblong-ovate, about 7 mm. long, 2.5 mm. broad, subemarginate; pollen-grains about 40 × 22 μ; capsule 6 mm. long, 2 mm. broad, slightly puberulent near the apex, constricted base 3 mm. long; seeds 2.2 × 1.8 mm.

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[15] **H. longipes** Happ, sp. nov., herbacea perennis; caulibus ramosis gracilibusque, pilosis vel glabratis; foliis lanceolatis vel ovatis, 0.5–8 cm. longis, 0.5–3.5 cm. latis, apice basique acuminatis vel parce obtusis, utrinque ex medio-nervo 3–5 nervis, utrinque sparse pilosis vel glabratis; spicis densis, 2–8 cm. longis; caulis bracteis oblanceolatis, 3–5 mm. longis; involucri bracteis 7–8 mm. longis, apice obtuso, glanduloso-pilosis vel pilosis, mucrone erecto, inconspicuo, ad apicem bracteae posito; corolla 10–12 mm. longa.—Collected at San Salvador, Salvador, coll. of 1925, *Calderon 2283* (Field Mus. Herb. TYPE).

DISTRIBUTION: Salvador.

SALVADOR: San Salvador, coll. of 1925, *Calderon 2283* (US, M photo, F TYPE); vicinity of San Salvador, alt. 650–850 m., 2–7 Feb. 1922, *Standley 20449* (G, US, NY); same locality, 30 March–24 April 1922, *Standley 23103* (G, US, NY).

This species approaches *H. imbricans,* but presents several distinct differences. The ovate to lanceolate shape of the leaf with the acuminate apex and the occasionally acute but more commonly acuminate base is rather conspicuous. The petiole also is generally long. The mucro of the involucral bract, although rather short and inconspicuous, is continuous with the margin and usually erect. The bracts are somewhat short and rounded at the apex.

5. **H. flava** (Eastwood) Happ, n. comb.

Tetramerium flavum Eastwood in Proc. Amer. Acad. **44:** 608. 1909.

Plant 6–12 dm. high; stems erect, freely branched, terete to 4-angled, occasionally narrowly winged, at first evenly hispid with glandular hairs intermixed, later pubescent in lines, or glabrous; leaves ovate, 0.5–10 cm. long, 0.2–5 cm. broad, acuminate, mucronate at the apex, obtuse at the base, usually 6–8-nerved on either side of the midrib and prominent on the lower surface, at first pilose to occasionally tomentose beneath, sparsely pilose above, more conspicuously so on the midrib and nerves; petioles 0.1–2 cm. long, glandular-pilose to pilose in lines; inflorescences usually closely spicate, spikes 1–6 cm. long; flowers "canary yellow"; cauline bracts oblanceolate-linear, about 6 mm. long, 1 mm. or more broad, mucronulate, glandular-pilose; involucral bracts oblanceolate, about 1 cm. long, acute, glandular-pilose, closely imbricated, mucro 0.2 mm. long, erect, directly on the apical margin; calyx-lobes lanceolate-linear, 2 mm. long, glandular-pilose-puberulent; corolla about 18 mm. long, middle lobe of the anterior lip obovate, 10 mm. long, 7 mm. broad, the lateral lobes similar in outline, slightly narrower, posterior lip oblong-obovate, 10 mm. long, 3 mm. broad, subemarginate; pollen-grains about 23–40 μ.

DISTRIBUTION: western Mexico.

DURANGO: San Ramon, 21 April–18 May 1906, *Palmer 75* (G TYPE, US, NY, M, M photo, F, UCal).

The large yellow corolla-lobes, the closely imbricated inflorescence, the rather large involucral bracts, the prominent nerves on the under side of the leaf with the close pubescence especially on the midrib and nerves, and the rather consistently acute angles of the four-sided stem all mark this as a distinct species of the genus.

6. **H. yucatanensis** Happ, n. sp.[16]

H. costata Millsp. in Field Mus. Bot. **2**: 100. 1900, not A. Gray.

Stems freely branched, slender, cylindrical to somewhat 4-angled, at first evenly glandular-pilose, later pubescent in lines, or glabrous; leaves ovate, 1–6 cm. long, 0.5–5 cm. broad, abruptly acuminate, acute, obtuse to acuminate at the base, at first appressed-pilose on both surfaces, sparsely on the lower surface, more conspicuously so on the midrib and nerves; petioles 0.1–1.2 cm. long, glandular-pilose; inflorescences more or less closely spicate, the spikes 1–15 cm. long, lateral spikes soli-

[16] **H. yucatanensis** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-pilosis vel glabratis; foliis ovatis, 1–6 cm. longis, 0.5–5 cm. latis, apice abrupte acuminato, basi obtuso vel acuminato, adpresso-pilosis vel glabratis; spicis plus minusve densis, 1–15 cm. longis; caulis bracteis oblanceolatis, 3–5 mm. longis; involucri bracteis 10–11 mm. longis, apice acuminato, glanduloso-puberulis, mucrone ad apicem bracteae posito; corolla 13 mm. longa.—Collected on brush lands about Izamal, Yucatan, Mexico, Jan.–May 1895, *Gaumer 368* (Mo. Bot. Gard. Herb., TYPE).

tary or in pairs; internodes 5–15 mm. long; flowers yellow; cauline bracts oblanceolate, 3–5 mm. long, acute, mucronulate, glandular-pilose; involucral bracts oblanceolate, 10–11 mm. long, about 3 mm. broad, glandular-pilose, mucro 0.1 mm. long, inconspicuous, erect, directly on the apical margin; calyx-lobes lanceolate, 1.2 mm. long, puberulent; corolla 13 mm. long, middle lobe of the anterior lip obovate, 8 mm. long, 6 mm. broad, lateral lobes obovate, 8 mm. long, 5 mm. broad, posterior lip obovate-oblong, 8 mm. long, 4.2 mm. broad, subemarginate; pollen-grains about 35 × 20 μ; capsule 6–7 mm. long, 2 mm. broad, somewhat pubescent near the apex, the constricted base about 3 mm. long; seeds 2 × 1.5 mm.

DISTRIBUTION: southern Mexico.

YUCATAN: brush lands about Izamal, Jan.–May 1895, *Gaumer 368* (G, US, NY, M TYPE, Cop, F, UCal, CalAcad, D, UMich); Silam, without date, *Gaumer 1712* (US, NY, M, F); Calotmul, without date, *Gaumer 1713* (US, Cop, F, CalAcad); without locality, 15–20 Feb. 1901, *Goldman 590* (US); Colonia San Cosmé, 20 Feb. 1906, *Greenman 350* (G, US, NY, B, F); Izamal, 21 Feb. 1906, *Greenman 391* (G, F); stairway east side of Cerro Grande, Izamal, 13 Jan. 1895, *Millspaugh 65* (US, F, CalAcad); Progresso, 5 March 1899, *Millspaugh 1661* (F); ruins of Mayapan, 19 Feb. 1903, *Seler 3875* (G, NY, B, F); stony hill, Izamal, 11 March 1903, *Seler 3922* (G, US, NY, B, F); Tunkas, 3 March 1890, *Stone 244* (PhilAcad).

This species is at present known only from Yucatan. It seems most closely allied to *H. insularis,* from which it differs in having larger, broader, and more conspicuously nerved bracts of the inflorescence, a larger corolla, and a more densely glandular pubescence.

7. **H. Ortegana** Happ, n. sp.[17]

Plant about 1 m. high; stems freely branched, subterete in cross-section, at first evenly glandular-hirsute, later gland-tipped hairs intermixed with hirsute hairs in lines, or glabrous; leaves ovate to lanceolate-ovate, 1–4.5 cm. long, 0.5–2.5 cm. broad, acuminate, rounded to acute at both ends, usually 4–7-nerved on either side of the midrib, at first glandular-pubescent on both surfaces, later sparsely glandular-pubescent intermixed with occasional hirsute hairs, more conspicuously so on the midrib and nerves, somewhat glabrate; petioles 0.1–1.3 cm. long, at first glandular-hirtellous, later glabrate; inflorescences more or less closely spicate, spikes 1–10 cm. long, internodes usually 0.3–1 cm. long; cauline bracts oblanceolate-oblong, mostly 5–10 mm. long, 1–2 mm. broad, minutely glandular-hirtellous intermixed with longer gland-tipped hairs; involucral bracts oblong-oblanceolate, 10–13 mm. long, 4–5 mm. broad, acute to obtusish at the apex, closely glandular-hirtellous intermixed with longer gland-tipped hairs, mucro 0.2–0.3 mm. long, erect, directly on the apical margin; calyx-lobes lanceolate, about 1 mm. long, glandular-puberulent; corolla 18–20 mm. long, white, middle lobe of the anterior lip oblanceolate, about 10 mm. long, 4 mm. broad, other lobes similar in shape and size; posterior lip emarginate; pollen-grains 48 × 23 μ; capsule 8–10 mm. long, 4 mm. broad, puberulent near the apex, the constricted base 5 mm. long, seeds 4, 2 × 1.6 mm.

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[17] **H. Ortegana** Happ, sp. nov., herbacea perennis; caulibus ramosis, gracilibus et subteretibus, glanduloso-hirsutis vel glabris; foliis ovatis vel lanceolato-ovatis, 1–4.5 cm. longis, 0.5–2.5 cm. latis, apice et basi rotundis vel acutis, utrinque ex medio nervo 4–7 nervis, glanduloso-pubescentibus vel glabratis; petiolis 0.1–1.3 cm. longis; caulis bracteis oblanceolato-oblongis, 5–10 mm. longis, minute glanduloso-hirtellis et glanduloso-pubescentibus; involucri bracteis oblongo-oblanceolatis, 10–13 mm. longis, dense glanduloso-hirtellis et glanduloso-pubescentibus, mucrone 0.2–0.3 mm. longo, erecto, ad apicem bracteae posito; corolla 18–20 mm. longa.—Collected at San Ignacio, Sindicate of San Juan, Sinaloa, Mexico, March 1931, *Ortega 6868* (Mo. Bot. Gard. Herb., TYPE).

DISTRIBUTION: western Mexico.

SINALOA: "C. de la Silla," San Ignacio, alt. 1200 m., 20 April 1918, *Montes & Salazar 293* (US); San Ignacio, Sindicate of San Juan, March 1931, *Ortega 6868* (M TYPE, F, CalAcad); definite locality not indicated, coll. of 1933, *Ortega 7184, 7186* (F).

This species seems to be somewhat intermediate between *H. flava* and *H. grandifolia.* The more prominently veined leaves and the larger bracts with a more glandular surface indicate a distinct difference from the first, and the smaller leaves and the mucro directly on the apical margin of the involucral bract separate it from the latter. The white flowers are among the largest of the genus.

8. H. gualanensis (Robinson & Bartlett) Happ, n. comb.
Pl. 33, fig. 5.

Tetramerium gualanense Robinson & Bartlett in Proc. Amer. Acad. **43**: 58. 1907

Plant suffruticose, 1 m. high; stems freely branched, somewhat 4-angled, at first evenly glandular-hirsute, later pubescent in lines, or glabrous; leaves ovate to elliptic, 1–9 cm. long, 0.6–4 cm. broad, abruptly acuminate, obtuse to rounded, abruptly acuminate at the base, 4–6-nerved on either side of the midrib, at first glandular-pilose on both surfaces, sparingly so on the upper surface, later inconspicuously appressed-pilose on both surfaces, becoming glabrate above; inflorescences more or less densely spicate, spikes 1.5–5 cm. long, terminal and solitary or in pairs; flowers white; cauline bracts oblanceolate, 8–12 mm. long, 3–5 mm. broad, usually equal to or exceeding the total length of the involucral bracts, glandular-hirsute on both surfaces, mucronulate; involucral bracts oblanceolate, 9–10 mm. long, 3 mm. broad, glandular-hirsute, mucro 1 mm. long, erect, more or less directly on the apical margin; calyx-lobes lanceolate-linear, 1.5 mm. long, pubescent; corolla 13 mm. long, middle lobe of the anterior lip obovate, 8 mm. long, 4 mm. broad, concave, lateral lobes obovate-oblong, 8 mm. long, 3 mm. broad, posterior lip oblong-obovate, 8 mm. long, 2 mm. broad, subemarginate; pollen-grains about 28 × 22 μ; capsule 6 mm. long, 2.2 mm. broad, the constricted base 3 mm. long; seeds 2.6 × 2 mm.

DISTRIBUTION: Guatemala.

GUATEMALA: Gualan, Dept. Zacopa, alt. 130 m., 18 Jan. 1905, *Deam 397* (G TYPE, M photo, UMich).

The large ovate-rotund leaves, the conspicuously large cauline bracts frequently longer than the subtended involucral bracts, and the long glandular pubescence are characteristic of this distinctive species. Due to the larger cauline bracts, the species appears to be somewhat intermediate between *Henrya* and *Tetramerium*.

9. **H. scorpioides** Nees in DC. Prodr. **11:** 491. 1847.
Pls. 30, 33.

Tetramerium scorpioides (Nees) Hemsl. Biol. Cent.-Am. Bot. **2:** 526. 1882; Lindau ex Loesen. in Bull. Herb. Boiss. **5:** 679. 1897, as *T. scorpioides* (Nees et Bth.) Lindau.

Stems freely branched, at first evenly glandular-pilose, later pubescent in lines, or glabrous; leaves ovate, 0.5–5 cm. long, 0.3–2.5 cm. broad, at first acute, later long-acuminate, obtuse at the apex, obtuse to short-acuminate at the base, 5–7-nerved on either side of the midrib, in the early stages closely pilose intermixed with gland-tipped hairs, later sparsely pilose on both surfaces, more conspicuously so on the midrib and nerves, frequently glabrate on the upper surface; petiole 0.1–1.5 cm. long, densely pilose to glabrate; inflorescences more or less closely spicate, the spikes 2–10 cm. long, terminal and one to several at the nodes; flowers "yellowish-white"; cauline bracts linear-lanceolate, 1–2 mm. long, glandular-pilose; involucral bracts oblanceolate, 6–8 mm. long, about 2 mm. broad, glandular-pilose, mucro 0.3–0.5 mm. long, slightly recurved, 0.1–0.2 mm. below the apical margin; bracteoles when present 2, lanceolate, 1.5 mm. long, puberulent; calyx-lobes lanceolate-linear, about 0.8 mm. long, puberulent; corolla 11–12 mm. long, middle lobe of the anterior lip obovate, 7 mm. long, 3 mm. broad, lateral lobes obovate-oblong, 7 mm. long, about 2 mm. broad, posterior lip oblong-obovate, 7 mm. long, 1.2 mm. broad, emarginate; pollen-grains about 42 × 20 μ; capsule 5–6 mm. long, about 2 mm. broad, puberulent near the apex, constricted base about 3 mm. long, seeds 2 × 1.3 mm.

DISTRIBUTION: Mexico and Nicaragua.

MEXICO.

SAN LUIS POTOSI: limestone hills, Las Palmas, 5 June 1890, *Pringle 3506* (G, F); limestone ledges, Las Palmas, April 1894, *Pringle 5947* (M); limestone hills, Las Palmas, alt. 120 m., 9 March 1899, *Pringle 7699* (G, Cop, Utrecht, F); without definite locality, 1851, *Virlet d'Aoust 817* (Cop).

VERA CRUZ: without definite locality, April 1865–66, *Hahn, without number* (K); La Purga, 27 Jan. 1906, *Greenman 224* (G, US, NY, F); Mirador, Jan. 1839, *Linden 190* (K TYPE, B, M photo); rocky soil, Rio de Santa Maria, Zacuapan and vicinity, Nov. 1906, *Purpus 2261* (G, US, M, B, F, UCal); Remudadero, Jan. 1922, *Purpus 8863* (UCal, D, P); same locality, April 1922, *Purpus, without number* (UCal, D, P); rocky thorn forests near Rancho Remudadero, March 1928, *Purpus 11155* (NY, PhilAcad, D); rocky soil, Puente Nacional, April 1928, *Purpus 11155* (US, M, F); rocky thorn forests near Rancho Remudadero, April 1928, *Purpus 11166* (NY, F, PhilAcad); rocky thorn woods, Rancho Remudadero, March 1933, *Purpus, without number* (M); San Francisco, near Vera Cruz, May 1894, *C. L. Smith 1330* (G).

SINALOA: east of Presidio de Mazatlan, 7 June 1849, *Gregg 1159* (M).

MEXICO: by the river, Tejupilco, Distr. Temascaltepec, 9 March 1934, *Hinton 5756* (M, K).

OAXACA: Tomellin Canyon, alt. 700 m., 17 May 1894, *Pringle 4634* (G, US, NY, M, Utrecht, PhilAcad, UCal); Chivela, 7 March 1934, *Mell 2255* (NY); Cerro Concordia, alt. 650–800 m., 8–14 April 1933, *Morton & Makrinius 2673* (US).

NICARAGUA: near Granada, Dec. 1847, *Oersted, without number* (B).

This is one of the most widely distributed species of the genus and is most frequently represented in herbaria. The rather loose spikes, comparatively small acuminate involucral bracts, and the recurved mucro, located slightly below the apical margin, render it of ready recognition.

9a. H. scorpioides Nees var. **latifolia** Happ, n. var.[18]

Leaves mostly ovate-rotund, 1–15 cm. long, 0.7–10 cm. broad, abruptly acuminate, frequently mucronulate; petioles 0.1–7.5 cm. long; mucro of the involucral bracts 0.5 mm. long, divergent, conspicuous.

DISTRIBUTION: central and southern Mexico, and Central America.

MEXICO.

COLIMA: Manzanillo, 2–18 March 1891, *Palmer 1330a* (US, B).

VERA CRUZ: La Ternera, 1919, *Purpus 8235* (B, UCal); Barranca de Panoaya, Dec. 1919, *Purpus 8495* (G, US, M TYPE, B, UCal).

NICARAGUA: without definite locality, coll. of 1853–56, *C. Wright, without number* (G, US).

GUATEMALA: without definite locality or date, *Friedrichsthal, without number* (K).

This variety differs from the species largely by the broader rotund-ovate leaves and the longer petioles. It occurs rather generally within the range of the species.

10. H. pilosa Happ, n. sp.[19]

Stems freely branched; branches slender, at first conspicuously pilose intermixed with occasional gland-tipped hairs, later pubescent in lines, more or less glabrous; leaves broadly ovate to rotund-ovate, 1–5 cm. long, 0.7–4 cm. broad, abruptly acuminate, acute to submucronate, subcordate to abruptly acuminate at the base, usually 3–5-nerved on either side of the midrib, at first sparsely pilose, later glabrous on both surfaces, membranaceous; petiole 0.3–4.2 cm. long, densely pilose to sparsely pilose in lines; inflorescences closely spicate, the spikes 1–3.5 cm. long, terminal and usually solitary or paired at the nodes; cauline bracts linear-lanceolate, about 2 mm. long, pilose; involucral bracts oblanceolate, 7–8 mm. long, about 2 mm. broad, conspicuously white-pilose sparsely intermixed with gland-tipped hairs, mucro 0.5 mm. long, slightly divergent, 0.1–0.2 mm. below the apical margin; calyx-lobes lanceolate, 0.7 mm. long, puberulent; corolla 10–11 mm. long, middle lobe of the anterior lip obovate, 7 mm. long, 3 mm. broad, concave lateral lobes obovate-oblong, 7 mm. long, 2.6 mm. broad, posterior lip oblong-obovate, 7 mm. long, about 1.8 mm. broad, subemarginate; pollen-grains about $40 \times 25\ \mu$; capsule 5–5.5 mm. long, about 2 mm. broad, pubescent near the apex, the constricted base about 2.5 mm. long; seeds 2×1.2 mm.

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[18] **H. scorpioides** Nees var. **latifolia** Happ, var. nov., herbacea perennis; foliis ovato-rotundis, 1–15 cm. longis, 0.7–10 cm. latis, apice breviter acuminato; petiolis 0.1–7.5 cm. longis.—Collected at Barranca de Panoaya, Vera Cruz, Mexico, Dec. 1919, *Purpus 8495* (Mo. Bot. Gard. Herb. TYPE).

[19] **H. pilosa** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, pilosis et parce glanduloso-pilosis vel glabratis; foliis rotundo-ovatis vel ovatis, 1–5 cm. longis, 0.7–4 cm. latis, apice breviter acuminato et basi acuto vel subcordato, utrinque parce pilosis vel glabris; petiolis 0.3–4.2 cm. longis; spicis plus minusve densis, 1–3.5 cm. longis; caulis bracteis lineari-lanceolatis, 2 mm. longis; involucri bracteis oblanceolatis, 7–8 mm. longis, pilosis et parce glanduloso-pilosis, mucrone 0.5 mm. longo, sub apice bracteae posito; corolla 10–11 mm. longa.—Collected near Manzanillo, Colima, Mexico, 2–18 March 1891, *Palmer 1330* (U. S. Nat. Herb., TYPE).

DISTRIBUTION: southwestern Mexico.

MEXICO.

COLIMA: near Manzanillo, 2–18 March 1891, *Palmer 1330* (G, US TYPE, NY, M photo).

The rotund-ovate membranaceous leaves, mostly glabrate on both surfaces, and the densely pilose bracts with conspicuously long mucros, are important diagnostic characters of this species.

11. **H. laxa** Happ, n. sp.[20]

Stems freely branched; branches lax, slender, at first stipitate-glandular, later pubescent in lines, or glabrate; leaves ovate, 1–2.5 cm. long, 0.5–1 cm. broad, acuminate, mucronulate, obtuse at the base, 3–5-nerved on either side of the midrib, at first glandular-hirsute, later somewhat glabrate; petioles 1–2 cm. long, glandular-hirsute; inflorescences more or less loosely spicate, spikes 1–15 cm. long, internodes usually 6–7 mm. long; cauline bracts linear-lanceolate, 2–3 mm. long, 0.5 mm. broad, glandular-hirsute; involucral bracts oblanceolate, 6–7 mm. long, about 2.5 mm. broad, mucro 0.2–0.3 mm. long, divergent, 0.2–0.3 mm. below the apical margin; calyx-lobes lanceolate, posterior lobe 0.5 mm. long, anterior lobes 1 mm. long, ciliate; corolla 10 mm. long, middle lobe of the anterior lip obovate, 7 mm. long, 3 mm. broad, concave, lateral lobes obovate-oblong, 7 mm. long, 2.8 mm. broad, posterior lip oblong-obovate, 7 mm. long, 1.8 mm. broad, emarginate; pollen-grains about 37 × 24 μ; capsule 6 mm. long, 1.6 mm. broad, glabrous, the constricted base 3.2 mm. long; seeds 2 × 1.5 mm.

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[20] **H. laxa** Happ, sp. nov., herbacea perennis; caulibus laxe ramosis et gracilibus, glanduloso-pubescentibus vel glabratis; foliis ovatis, 1–2.5 cm. longis, 0.5–1 cm. latis, apice acuminato, basi obtuso, utrinque glanduloso-hirsutis vel glabratis; petiolis 1–2 cm. longis; spicis plus minusve laxis, 1–15 cm. longis, internodiis 6–7 mm. longis; caulis bracteis lineari-lanceolatis, 2–3 mm. longis; involucri bracteis oblanceolatis, 6–7 mm. longis, dense glanduloso-hirsutis, mucrone 0.2–0.3 mm. longo, sub apice bracteae posito; corolla 10 mm. longa.—Collected at Acapulco and vicinity, Guerrero, Mexico, Oct. 1894–March 1895, *Palmer 575* (Mo. Bot. Gard. Herb., TYPE).

DISTRIBUTION: southwestern Mexico.

GUERRERO: Acapulco and vicinity, Oct. 1894–March 1895, *Palmer 575* (G, US, M TYPE, F, UCal).

The long lax spikes, the loosely imbricated involucral bracts, and the extremely glandular pubescence definitely characterize this species.

12. **H. imbricans** Donnell Smith in Bot. Gaz. **16**: 198. 1891. Plant about 3 dm. high; stems several, decumbent, slender, cylindrical to somewhat 4-angled, at first evenly pilose and closely intermixed with glandular-puberulent hairs, later pubescent in lines, or glabrous, whitish; leaves ovate, 1–3.5 cm. long, 0.5–1.7 cm. broad, acuminate, mucronate, obtuse or rounded to abruptly acuminate at the base, 5–7-nerved on either side of the midrib, closely pilose on the lower surface, sparsely so above, more conspicuously so on the midrib and nerves, closely intermixed with gland-tipped puberulent hairs; petiole 0.2–1 cm. long, glandular-puberulent; inflorescence closely spicate, spikes 1–8 cm. long, terminal and solitary or laterally disposed in pairs; cauline bracts oblanceolate, 5–7 mm. long, 1 mm. broad, pilose intermixed with glandular-puberulent hairs; involucral bracts oblanceolate, 9–11 mm. long, about 4 mm. broad, glandular-puberulent closely intermixed

with glandular-pilose and simple hairs, mucro 0.2–0.3 mm. long, divergent, 0.1–0.2 mm. below the apical margin; bracteoles 2, broadly lanceolate, 2.5–3 mm. long, hispidulous; calyx-lobes lanceolate, about 1.5 mm. long, hispidulous; corolla 11–13 mm. long, middle lobe of the anterior lip oblanceolate, about 8 mm. long, 3 mm. broad, lateral-lobes oblanceolate-oblong, 8 mm. long, about 3 mm. broad, posterior lip oblong-oblanceolate, 8 mm. long, 1.5 mm. broad, subemarginate; pollen-grains about 40 × 20 μ; capsule 6–7 mm. long, about 2.5 mm. broad, glabrous, constricted base about 3 mm. long; seeds 2.7 × 2.1 mm.

DISTRIBUTION: Guatemala.

GUATEMALA: without definite locality and date, *Kellerman 5215* (US); Laguna Amatitlan, Dept. Amatitlan, alt. 3900 m., *Donnell Smith 1923* (G, US TYPE, NY, M photo, PhilAcad); El Cerrito, between La Laguna and Amatitlan, southern shore of Lake Amatitlan, Dept. Amatitlan, alt. 1300 m., *Pittier 125* (US, B).

This species is readily distinguished by the close imbrication of the spikes, the acute rather long bracts, and the slightly recurved mucro.

13. H. puberula Happ, n. sp.[21]

Stems freely branched; branches slender, at first evenly glandular-puberulent sparsely intermixed with pilose hairs, later evenly pilose, pubescent in lines, more or less glabrate; leaves lanceolate to ovate, 1–3 cm. long, 0.3–1.3 cm. broad, acuminate, acute, obtuse to acuminate at the base, usually 3–5-nerved on either side of the midrib, nerves prominent on the lower side, at first evenly and minutely glandular-puberulent occasionally intermixed with pilose hairs, later sparsely pilose on both surfaces, more conspicuously so on the midrib and nerves; inflorescences densely spicate, spikes 2–3 cm. long, terminal and solitary or in pairs laterally disposed, internodes 2–3 mm. long; cauline bracts linear-lanceolate, 4–5 mm. long, about 0.3 mm. broad, minutely glandular-puberulent, mucro 0.2–0.3 mm. long;

[21] **H. puberula** Happ, spec. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-puberulis, sparse pilosis vel glabris; foliis lanceolatis vel ovatis, 1–3 cm. longis, 0.3–1.3 cm. latis, apice basique acuminatis vel obtusis, utrinque glanduloso-puberulis, pilosis vel glabris; spicis 2–3 cm. longis, internodiis 2–3 mm. longis; caulis bracteis lineari-lanceolatis, 4–5 mm. longis; involucri bracteis oblanceolatis, 9–10 mm. longis, minute glanduloso-puberulis, mucrone 0.5–0.8 mm. longo ad apice bracteae posito.—Collected at Amatitlan, Dept. Amatitlan, Guatemala, alt. 1100 m., Feb. 1928, *Morales 911* (Field Mus. Herb., TYPE).

involucral bracts oblanceolate, 9–10 mm. long, about 2.7 mm. broad, minutely glandular-puberulent, mucro 0.5–0.8 mm. long, puberulent near the base, conspicuously divergent, 0.1–0.2 mm. below the apical margin; calyx-lobes lanceolate-linear, 1.5 mm. long, puberulent; capsule 6 mm. long, 2 mm. broad, glabrous, the constricted base 3 mm. long; seeds 2.3 × 1.5 mm.

DISTRIBUTION: Guatemala.

GUATEMALA: Amatitlan, Dept. Amatitlan, alt. 1100 m., Feb. 1928, *Morales 911* (US, M photo, F TYPE).

The short lateral spikes, the acuminate involucral bracts, and the inconspicuous puberulence are characteristic of this species.

14. **H. Conzattii** Happ, n. sp.[22]

Stems freely branched; branches slender, cylindrical to somewhat 4-angled, at first inconspicuously pilose in lines, later glabrous; leaves ovate, 0.8–2 mm. long, 0.3–1.3 mm. broad, acuminate, acute, obtuse at the base, 3–5-nerved on either side of the midrib, at first appressed-stoutish-pilose on both surfaces, more conspicuously so on the midrib and nerves; petioles 1–3 mm. long, sparsely pilose to glabrous; inflorescences closely spicate, spikes 1–2.5 cm. long, internodes 2 mm. long; cauline bracts linear-lanceolate, 2–3 mm. long, 0.5 mm. broad, mucronulate, minutely pilose-ciliolate; involucral bracts oblanceolate, 7–8 mm. long, about 2 mm. broad, acutish at the apex, glabrous or occasionally inconspicuously ciliate-margined, mucro about 0.2 mm. long, divergent, 0.1–0.2 mm. below the apical margin; calyx-lobes lanceolate, 1 mm. long, pubescent; pollen-grains about 35 × 20 μ; capsule 4–5 mm. long, about 1.5 mm. broad, glabrous, the constricted base 2 mm. long; seeds 1.7 × 1.2 mm.

DISTRIBUTION: southern Mexico.

OAXACA: "Cerro de Apango de Hualulco," Distr. Pochullo, alt. 600 m., 20 April 1917, *Conzatti, Reko & Makrinius 3152* (US TYPE, M photo).

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[22] **H. Conzattii** Happ, sp. nov., herbacea perennis; caulibus ramosis, parce pilosis vel glabris; foliis ovatis, 0.8–2 cm. longis, 0.3–1.5 cm. latis, apice acuto, basi obtuso, utrinque parce adpresso-pilosis vel glabris; spicis 1–2.5 cm. longis, densis, internodiis 1–2 mm. longis; caulis bracteis lineari-lanceolatis, 2–3 mm. longis; involucri bracteis oblanceolatis, 7–8 mm. longis, plerumque glabris, parce pilosis, mucrone brevi, sub apice bracteae posito.—Collected at "Cerro de Apango de Hualulco," Distr. Pochullo, Oaxaca, Mexico, alt. 600 m., 20 April 1917, *Conzatti, Reko & Makrinius 3152* (U. S. Nat. Herb., TYPE).

The short spikes, the subapical mucro, and the glabrate condition of the entire plant readily distinguish this species from its immediate allies.

15. H. grandifolia Fernald in Bot. Gaz. **20**: 537. 1895.

Plant 7–13 dm. high; stems freely branched; branches slender, at first evenly glandular-hispid, later glandular-pubescent in lines, or glabrous; leaves lanceolate-ovate, 2–13 cm. long, 1–5.5 cm. broad, acuminate, obtusish, acuminate at the base, usually 6–8-nerved on either side of the midrib, at first glandular-pubescent on both surfaces, later scattered appressed-pilose, more conspicuously so on the midrib and nerves; petioles 0.1–3 cm. long, glandular-pubescent to glabrous; inflorescences loosely spicate; spikes 1.5–10 cm. long, internodes usually 10–12 mm. long, axillary spikes solitary; flowers white; cauline bracts oblanceolate, 2–3 mm. long, about 1 mm. broad, obtuse at the apex, conspicuously 3-nerved, densely glandular-pubescent; involucral bracts oblanceolate, 10–12 mm. long, about 3 mm. broad, rounded at the apex, densely glandular-pubescent, mucro 0.1–0.2 mm. long, inconspicuous, about 0.4 mm. below the apical margin; calyx-lobes lanceolate, 2 mm. long, puberulent; corolla about 16 mm. long, white, middle lobe of the anterior lip obovate, 10 mm. long, 5 mm. broad, lateral lobes obovate-oblong, 10 mm. long, 4 mm. broad, posterior lip oblong-obovate, 10 mm. long, 3 mm. broad, subemarginate; pollen-grains about 40 × 25 μ.

DISTRIBUTION: western Mexico.

SINALOA: Esquinapa, Jan. 1895, *Lamb 505* (G TYPE, M photo).

NAYARIT: Acaponeta, 23–30 Jan. 1897, *Rose 3125* (US).

GUERRERO: Achotla, alt. 900 m., 4 Jan. 1927, *Reko 5048* (US).

The usually large leaves, rather loose inflorescence, and the large involucral bracts with inconspicuous subapical mucro are distinctive characteristics of this species.

16. H. Barclayana Nees in Bot. Voy. Sulphur, p. 149. 1844; DC. Prodr. **11**: 468. 1847. Pl. 33, fig. 14.

Tetramerium scorpioides (Nees) Hemsl. Biol. Cent.-Am. Bot. **2**: 526. 1882, in part.

Stems freely branched; branches slender, cylindrical to slightly winged, 4-angled, at first evenly glandular-hirsute, later pubescent in lines, more or less glabrate; leaves elliptical to ovate, 1–3.5 cm. long, 0.5–2 cm. broad, acuminate, mucronulate to obtusish, obtuse to acute at the base, sparsely glandular-pilose on both surfaces, more conspicuously so on the midrib and nerves, usually 3–5-nerved on either side of the midrib; petioles 1–3 mm. long, glandular-hirsute; inflorescences closely spicate, spikes 1–7 cm. long, terminal or solitary in the leaf axils; cauline bracts oblanceolate, 2–4 mm. long, about 1 mm. broad, conspicuously 3-nerved, glandular-hirsute; involucral bracts oblanceolate, 9–10 mm. long, 4 mm. broad, rounded at the apex, glandular-hirsute, mucro about 0.5 mm. long, slightly divergent, 0.5–0.7 mm. below the apical margin; calyx-lobes broadly lanceolate, 1.5 mm. long; corolla 14–16 mm. long, middle lobe of the anterior lip ovate, 10 mm. long, 6 mm. broad, convex, lateral lobes obovate-oblong, 10 mm. long, 5 mm. broad, posterior lip oblong-ovate, 10 mm. long, 4 mm. broad; pollen grains about $40 \times 20\ \mu$.

DISTRIBUTION: southwestern Mexico.

JALISCO: without definite locality or date, specimen collected presumably by *Lay & Collie* during the voyage of Captain Beechy to the "Pacific and Bering's Strait," 1825–1828, in part (K).

NAYARIT: west of Ingenio, Santiago, 1 June 1849, in part, *Gregg 1017* (M); Tiger Mine, Acaponeta, 1 March 1927, *Jones 23049* (F, UCal, P).

COLIMA: Manzanillo Bay, without date, *Barclay, without number*, in part (K TYPE, M photo).

The lanceolate-elliptical leaves, closely imbricated spikes, large rounded apical involucral bracts, densely glandular-pubescence, and subapical mucro readily separate this species from others of the genus.

17. H. mephitica Happ, n. sp.[23]

Suffruticose plant 1–2 m. high; stems and branches cylindrical to somewhat 4-angled, at first evenly stipitate-glandular, later pubescent in lines, more or less glabrate; leaves lanceolate-elliptic to ovate-elliptic, 1–3 cm. long, 0.3–1.5 cm. broad, nerves usually prominent on the lower surface, mostly 3–5-nerved on either side of the midrib, appressed-pilose, more conspicuously so on the midrib and nerves, later glabrous; petioles 0.1–1 cm. long, pilose to glabrous; inflorescences densely spicate, the spikes 1–6 cm. long, internodes 2–4 mm. long; flowers white, posterior lip streaked with reddish; the cauline bracts lanceolate-linear, 4 mm. long, 0.8 mm. broad, glandular-pilose, mucronate; involucral bracts oblanceolate, closely imbricated, 9–10 mm. long, about 3 mm. broad, obtusish, stipitate-glandular, mucro 0.2 mm. long, inconspicuous, erect, 0.1–0.2 mm. below the apical margin; calyx-lobes lanceolate-linear, about 2 mm. long, glandular-pilose; corolla about 15 mm. long, middle lobe of the anterior lip obovate, 9 mm. long, 4.5 mm. broad, lateral lobes obovate-oblong, 9 mm. long, 4 mm. broad, posterior lip oblong-obovate, 9 mm. long, 2.2 mm. broad, emarginate; pollen-grains about 45 × 22 μ.

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[23] **H. mephitica** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-pubescentibus vel glabratis; foliis lanceolatis vel ovato-ellipticis, 1–3 cm. longis, 0.3–1.5 cm. latis, utrinque ex medio-nervo 3–5 nervis, utrinque adpresso-pilosis vel glabratis; spicis 1–6 cm. longis, densis; internodiis 2–4 mm. longis; caulis bracteis lanceolato-linearibus, 4 mm. longis; involucri bracteis oblanceolatis, 9–10 mm. longis, mucrone 0.2 mm. longo, inconspicuo, sub apice bracteae posito; corolla 15 mm. longa.—Collected on dry arid slope, trail to Las Mesitas, San Sebastian, Jalisco, Mexico, alt. 1700 m., 17 March 1927, *Mexia 1864* (Cal. Acad. Sci. Herb., TYPE).

DISTRIBUTION: western Mexico.

JALISCO: dry rocky arid slope, trail to Las Mesitas, San Sebastian, alt. 1700 m., 17 March 1927, *Mexia 1864* (US, NY in part, M photo, CalAcad TYPE).

The conspicuous veins on the lower side of the leaves, the closely imbricated, large, oblong-obovate involucral bracts, and the inconspicuous apical mucro definitely characterize this species. This plant is said to have a rather pronounced mephitic odor, which, however, is not apparent in dried specimens.

18. H. Donnell-Smithii Happ, n. sp.[24]

Stems freely branched; branches slender, at first evenly glandular-hirsute, later pubescent in lines, more or less glabrate, whitish; leaves ovate-rotund to ovate, 1–6 cm. long, 1–3.5 cm. broad, acuminate, mucronulate to acute at the apex, at first rounded, later acuminate at the base, usually 5–6-nerved on either side of the midrib, in the early stages closely glandular-puberulent intermixed with longer glandular hairs on both surfaces, more conspicuously so on the midrib and nerves, later glabrate; petioles 0.1–2.5 cm. long, pubescent to glabrate; inflorescences closely spicate, spikes 1.4 cm. long, terminal and solitary or in pairs at the nodes, internodes 3–4 mm. long; cauline bracts oblanceolate, 2–3 mm. long, glandular-hispid, mucronulate; involucral bracts oblanceolate, 6–7 mm. long, about 3 mm. broad, glandular-hirsute intermixed with a glandular puberulence, mucro 0.2–0.3 mm. long, divergent, 0.1–0.2 mm. below the apical margin; calyx-lobes lanceolate, 1 mm. long, hispidulous; corolla 8 mm. long, middle lobe of the anterior lip obovate, 5 mm. long, 3 mm. broad, concave, lateral lobes obovate-oblong, 5 mm. long, 2.5 mm. broad, posterior lip oblong-obovate, 5 mm. long, 0.7 mm. broad, emarginate; pollen-grains about 42 × 20 μ; capsule 5 mm. long, 2 mm. broad, hirsute near the apex, constricted base 2.5 mm. long; seeds 1.3 × 1 mm.

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[24] **H. Donnell-Smithii** Happ, spec. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-hirsutis vel glabratis; foliis ovato-rotundis vel ovatis, 1–6 cm. longis, 1–3.5 cm. latis, apice acuminato, basi rotundo vel acuminato, utrinque ex medio-nervo 5–6 nervis, utrinque glanduloso-puberulis; petiolis 0.1–2.5 mm. longis; spicis 1–4 cm. longis, densis, internodiis 3–4 mm. longis; caulis bracteis oblanceolatis, 2–3 mm. longis; involucri bracteis oblanceolatis, 6–7 mm. longis, glanduloso-hirsutis puberulisque, mucrone sub apice bracteae posito; corolla 8 mm. longa.—Collected on Rio de Los Esclavos, Dept. Santa Rosa, Guatemala, alt. 800 m., Feb. 1893, *Heyde & Lux 4559* (Mo. Bot. Gard. Herb., TYPE).

DISTRIBUTION: Mexico and Central America.

MEXICO.

OAXACA: Lacs de Tutepeque, April 184-, *Galeotti 501a* (G, US, UCal).

GUATEMALA: without definite locality, coll. of 1892, *Heyde 687* (US); Rio de Los Esclavos, Dept. Santa Rosa, alt. 800 m., Feb. 1893, *Heyde & Lux 4559* (G, US, NY, M TYPE, B, F).

NICARAGUA: without locality and date, *Oersted 46* (K); near Granada, Dec. 1847, *Oersted 10765* (Cop).

The short oblong-obovate bracts quite set this species apart from *H. imbricans* which it somewhat resembles. The close glandular pubescence rather suggests *H. Barclayana,* from which it differs in size of bract and in position and shape of mucro.

19. H. rupicola Happ, n. sp.[25] Pl. 33, fig. 13.

Suffruticose plant 1–2 m. high; stems and branches at first glandular-pilose, later glandular-pilose in lines or glabrous;

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[25] **H. rupicola** Happ, spec. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-pilosis vel glabratis; foliis ovatis, 1–9 cm. longis, 0.5–4 cm. latis,

leaves ovate, 1–9 cm. long, 0.5–4 cm. broad, acuminate, mucronulate to acute, obtusish to acuminate at the base, 4–6-nerved on either side of the midrib, at first glandular-pilose on both surfaces, more conspicuously so on the midrib and nerves, later glabrate; petioles 0.1–2.5 cm. long, glandular-pilose to glabrous; inflorescences more or less closely spicate, spikes 1–6 cm. long, terminal, solitary or paired in the leaf-axils, internodes 4–5 mm. long; flowers white, posterior lip yellow-streaked, with a red spot; cauline bracts oblanceolate, about 3 mm. long, 1 mm. broad, glandular-hirsute, strongly recurved, mucronate; involucral bracts oblanceolate, 6–7 mm. long, about 3 mm. broad, rounded at the apex, glandular-hirsute, mucro 0.5 mm. long, divergent, 0.8–1 mm. below the apical margin; calyx-lobes lanceolate, posterior lobe 0.6 mm. long, lateral lobes 1.2 mm. long, glandular-hirtellous; corolla 12–13 mm. long, middle lobe of the anterior lip obovate, 8 mm. long, 5 mm. broad, lateral lobes obovate-oblong, 8 mm. long, 4 mm. broad, posterior lip oblong-obovate, 8 mm. long, 2 mm. broad, emarginate; pollen-grains about 38 × 22 μ.

DISTRIBUTION: southwestern Mexico.

JALISCO: dry arid rocky slope, trail to Las Mesitas, Sierra Madre, San Sebastian, alt. 1700 m., 17 March 1927, *Mexia 1864* (NY, M TYPE, F, UCal, D, UMich); roadside between San Sebastian and Las Palmas, alt. 300–700 m., 30 March 1897, *Nelson 4125* (G, US).

The small involucral bracts suggest a form of *H. insularis,* also found in this region. However, the distinctly obovate-oblong involucral bracts, the subapical mucro, as much as one millimeter below the apical margin, and the conspicuous glandulosity of the pubescence of the bract readily separate it from that species.

The New York Botanical Garden specimen of *Mexia 1864* represents two distinct elements, namely *H. mephitica* and *H. rupicola.*

apice et basi acutis vel obtusis, utrinque glanduloso-pilosis vel glabratis; petiolis 0.1–2.5 cm. longis; spicis 1–6 cm. longis, plerumque plus minusve densis, internodiis 4–5 mm. longis; caulis bracteis oblanceolatis, 3 mm. longis; involucri bracteis oblanceolatis, 6–7 mm. longis, glanduloso-hirsutis, mucrone sub apice bracteae posito; corolla 12–13 mm. longa.—Collected on dry arid rocky slope, trail to Las Mesitas, Sierra Madre, San Sebastian, Jalisco, Mexico, alt. 1700 m., 17 March 1927, *Mexia 1864* (Mo. Bot. Gard. Herb., TYPE).

20. H. reticulata Happ, n. sp.[26]

Suffrutescent erect plants about 1 m. high; stems freely branched; branches slender, at first stipitate-glandular, later glandular-pilose in lines, or glabrous; leaves ovate-rotund to ovate, 1–3 cm. long, 1–2.5 cm. broad, abruptly acuminate, mucronate to cuspidate, truncate to rounded at the base, in the early stages conspicuously reticulate-veined, usually 3–5-nerved on either side of the midrib, appressed-pilose on both surfaces, more especially on the midrib and nerves; petioles 0.2–2.5 cm. long, at first densely pilose sparsely intermixed with stipitate-glandular hairs, later glandular-pilose in lines, or glabrous; inflorescences closely spicate, spikes 1–4 cm. long, lateral spikes solitary or in pairs, internodes 2–3 mm. long; flowers yellowish-white; cauline bracts oblanceolate, about 3 mm. long, glandular-pilose, recurved, mucronate; involucral bracts oblanceolate, 7–8 mm. long, about 2.5 mm. broad, glandular-pilose, mucro 0.5 mm. long, slightly divergent, 0.3–0.4 mm. below the apical margin; calyx-lobes lanceolate, pilosulous; corolla 9 mm. long, middle lobe of the anterior lip obovate, 5.5 mm. long, 3 mm. broad, lateral lobes obovate-oblong, 5.5 mm. long, 3 mm. broad, posterior lip obovate-oblanceolate, 5.5 mm. long, 1.5 mm. broad, subemarginate; pollen grains about 25 × 40 μ; capsule about 5 mm. long, 2 mm. broad, puberulent near the apex, the constricted base about 2.4 mm. long; seeds 1.3 × 1 mm.

DISTRIBUTION: Salvador.

SALVADOR: roadside, vicinity of Ahuachapan, Dept. Ahuachapan, alt. 800–1000 m., 9–27 Jan. 1922, *Standley 20221* (G, US TYPE, NY, M photo); in hedge, vicinity of Ixtepeque, Dept. San Vicente, alt. about 400 m., 6 March 1922, *Standley 21424* (G, US, NY); brushy slope, vicinity of Izalco, Dept. Sonsonate, 19–24 March 1922, *Standley 21801* (G, US, NY).

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[26] **H. reticulata** Happ, sp. nov., herbacea perennis; caulibus ramosis et gracilibus, glanduloso-pilosis vel glabratis; foliis ovato-rotundis, 1–3 cm. longis, 1–2.5 cm. latis, apice breviter acuminato, basi truncato vel rotundo, utrinque ex medio nervo 3–5 nervis, utrinque adpresso-pilosis; petiolis 0.2–2.5 cm. longis, glanduloso-pilosis vel glabratis; spicis 1–4 cm. longis, densis, internodiis 2–3 mm. longis; caulis bracteis oblanceolatis, 3 mm. longis; involucri bracteis oblanceolatis, 7–8 mm. longis, glanduloso-pilosis, mucrone sub apice bracteae posito; corolla 9 mm. longa.—Collected on roadside, vicinity of Ahuachapan, Dept. Ahuachapan, Salvador, alt. 800–1000 m., 9–27 Jan. 1922, *Standley 20221* (US. Nat. Herb. TYPE).

The stems and branches of this plant are rather frequently covered with a dense lanate pubescence. The broad rotund-ovate leaves with usually long petioles indicate a possible relationship with *H. scorpioides* var. *latifolia.* The several spikes are closely clustered at the nodes as in *H. imbricans,* but are much shorter and with bracts bearing a more definitely sub-apical mucro.

GENUS AND SPECIES EXCLUDED

Henrya Augustiniana Hemsl. in Journ. Linn. Soc. Bot. **26**: 111. 1880.[27] = **Henryastrum Augustinianum** (Hemsl.) Happ, n. gen. and n. comb.

Henrya Silvestrii Pampan. in Nuov. Giorn. Bot. Ital. n.s. **17**: 696. 1900. = **Henryastrum Silvestrii** (Pampan.) Happ, n. comb.

LIST OF EXSICCATAE

The numbers of the collectors are in *italics.* If the collection is unnumbered, this is indicated by a dash. The number in parentheses indicate the number designated the species in this revision.

d'Aoust, V. *817* (8).
Barclay, G. — (16).
Brandegee, T. S. — (1); — (2).
Calderon, S. *2283* (4).
Conzatti, C., R. P. Reko & Makrinius. *3152* (14).
Deam, C. C. *397* (8).
Friedrichsthal, E. — (9a).
Galeotti, H. *510* (18).
Gaumer, G. F. *1712, 1713* (6).
Gaumer, G. F. & Sons. *368* (6).
Goldman, E. A. *590* (6).
Greenman, J. M. *350, 391* (6); *224* (9).
Gregg, J. *1159* (9); *1017* (16).
Hahn. — (9).
Heyde, E. T. *687* (18).
Heyde, E. T. & E. Lux. *4559* (18).
Hinton, G. B. *3410* (1); *5756* (9).
Hooker, J. D. *1045* (1).
Jones, M. E. *23188* (1); *23049* (16).
Kellerman, W. A. *5215* (12).
Lamb, F. H. *505* (15).
Lay & Collie. — (1); — (16).
Linden, J. *190* (9).
Mell, C. D. *2255* (9).
Mexia, Y. *1864* (17); *1864* (19).
Millspaugh, C. F. *65* (6); *1661* (6).
Montes & Salazar, F. *293* (7).
Morales, R. *911* (13).
Morton, C. V. & Makrinius. *2673* (9).
Nelson, E. W. *4125* (19).
Oersted, A. S. *10765, 46* (18).

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[27] Since *Henrya* of Nees was proposed in 1844 and continued intermittently since then, is generically distinct from *Tetramerium* of Nees, and since it contains about twenty-one species and varieties, it seems desirable to retain this name and give a new generic name to *Henrya* of Hemsley, which was published in 1880 and contains only two species. Therefore I suggest the name *Henryastrum* for the plant described by Hemsley as *Henrya* in Jour. Linn. Soc. Bot. **26**: 111. 1880.

Ortega, J. G. *5128* (1); *7184, 7186* (7).
Palmer, Ed. *211* (3); *75* (5); *1330a* (9a); *1330* (10); *575* (11).
Pittier, H. *125* (12).
Pringle, C. G. *3506, 4634, 5947, 7699* (9).
Purpus, C. A. *266* (1); —, *2261, 8863, 11155, 11166* (9); *8235, 8495* (9a).
Reko, R. P. *5048* (15).
Rose, J. N. *3125* (15).
Rose, J. N., P. C. Standley & P. G. Russell. *13845* (1); *12829* (2).
Seler, E. *3875, 3922* (6).
Sinclair, S. — (1).
Smith, C. L. *1330* (9); *1923* (12).
Standley, P. C. *20449, 23103* (4); *20221, 21424, 21801* (20).
Stone, W. *244* (6).

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New names and combinations here published are in **bold face** type. Accepted names previously published are in Roman type, and synonyms are in *italics*.

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SUPPLEMENT TO TETRAMERIUM

1b. Tetramerium nervosum Nees var. **acuminatum** Happ, n. var.[28]

Inflorescence loosely imbricated; bracts lanceolate to ovate-lanceolate, acuminate, strongly mucronate, mucro 1–1.5 mm. long, narrowed near the middle into a subpetiolate base.

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[28] **T. nervosum** Nees var. **acuminatum** Happ, var. nov.; inflorescentiis laxis, bracteis lanceolatis vel ovato-lanceolatis, basi cuneatis et subpetiolatis, apice acuminatis valde mucronatis, mucrone 1–1.5 mm. longo. Collected in Guayaquil, Province of Guayas, Ecuador, alt. 20 m., 15 Nov. 1936, *Mexia 8401a* (Mo. Bot. Gard. Herb. TYPE).

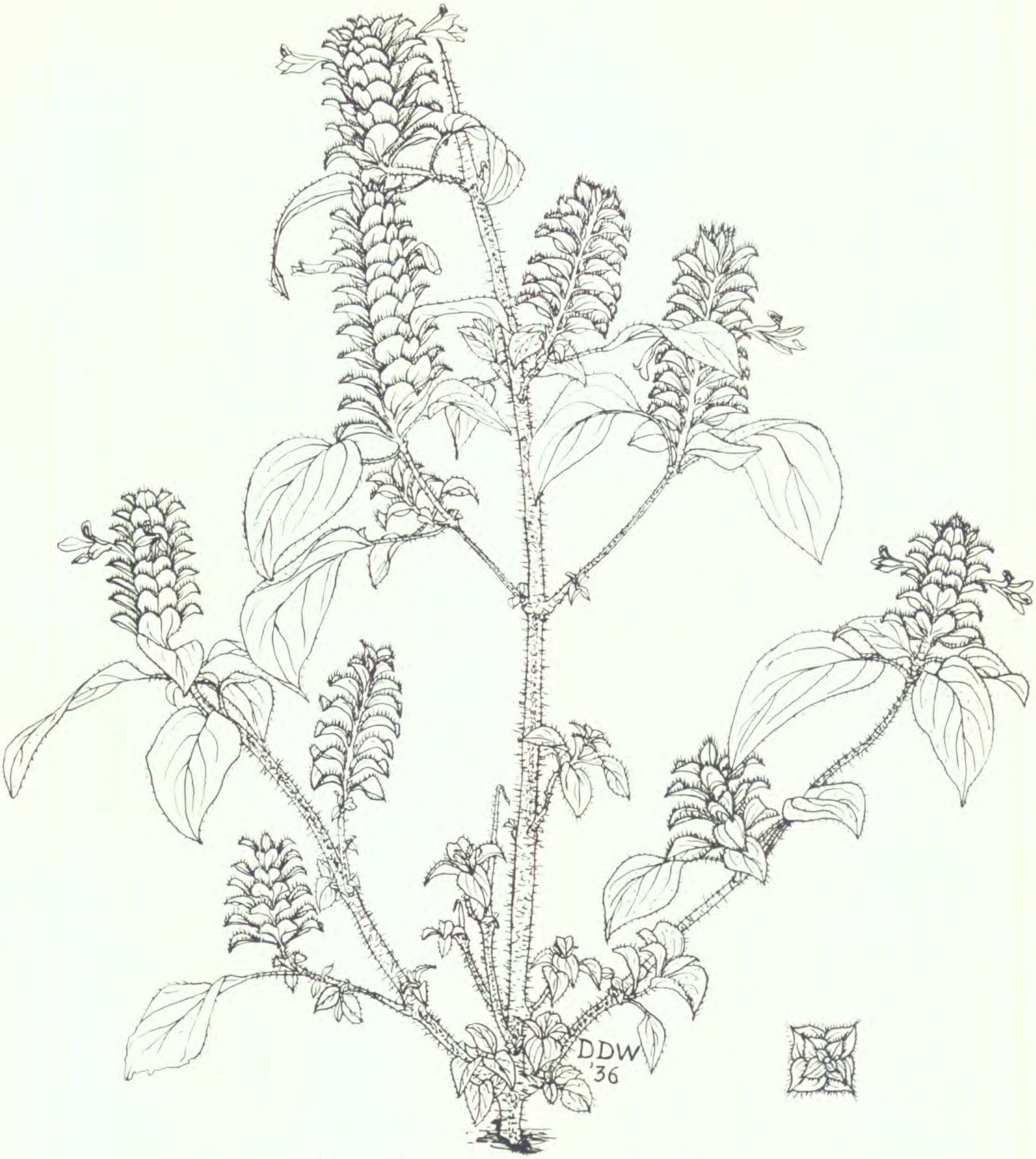
ECUADOR: Province of Guayas, Guayaquil, open lots, alt. 20 m., 15 Nov. 1936, *Mexia 8401a* (M TYPE).

This plant, collected by Mrs. Ynes Mexia, was received after the completion of the thesis on *Tetramerium.* The loosely imbricated spikes and the narrow more acuminate bracts with longer mucronate tips present a striking variation from *T. nervosum.*

EXPLANATION OF PLATE

PLATE 27

Habit and bracteal arrangement of *T. nervosum* Nees. Illustration made from living specimen grown at the Missouri Botanical Garden. × ½.

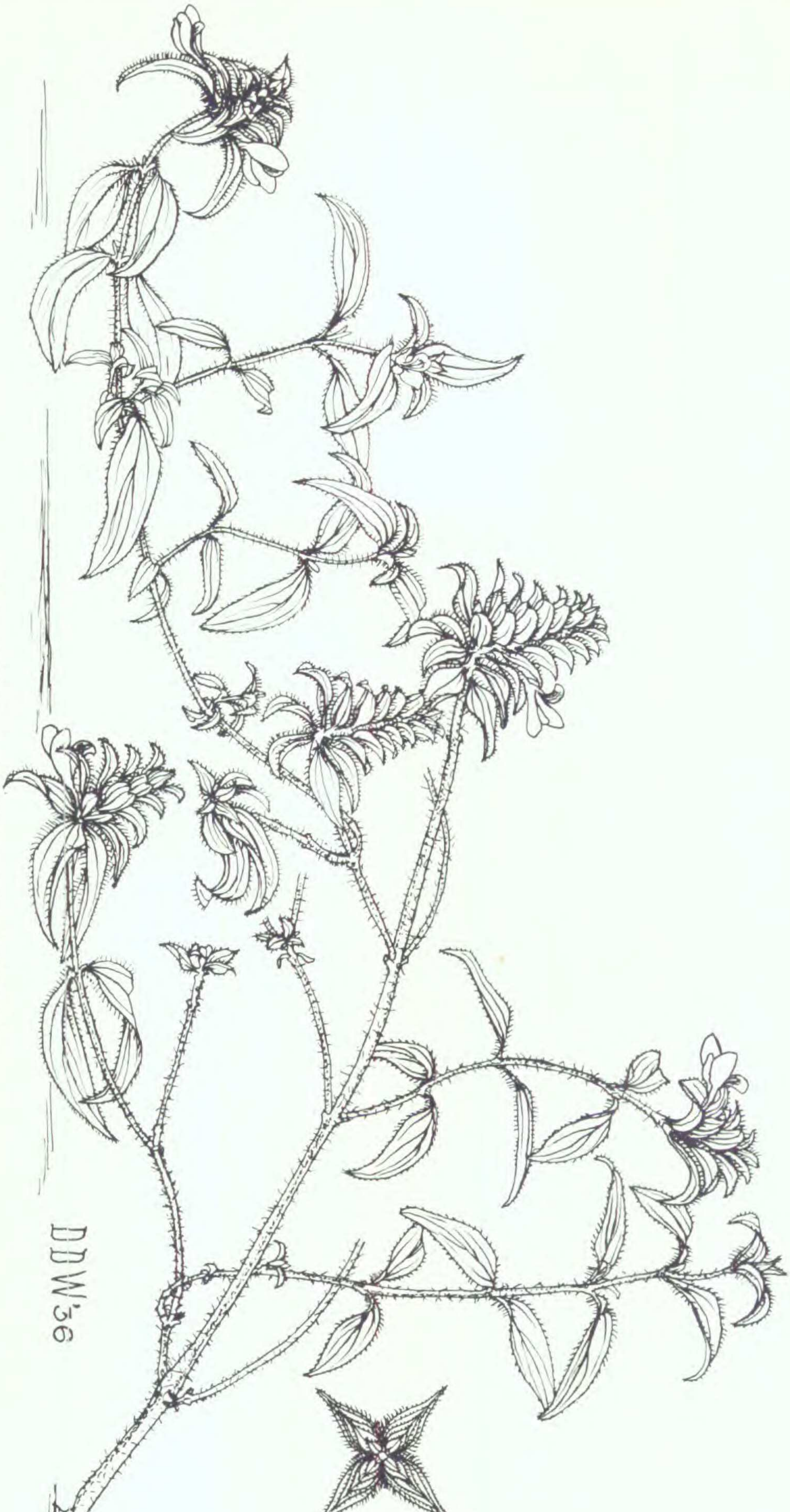


HAPP—TETRAMERIUM AND HENRYA

Explanation of Plate

PLATE 28

Habit and bracteal arrangement of *T. hispidum* Nees. Illustration made from living specimen grown at the Missouri Botanical Garden. × ¾.

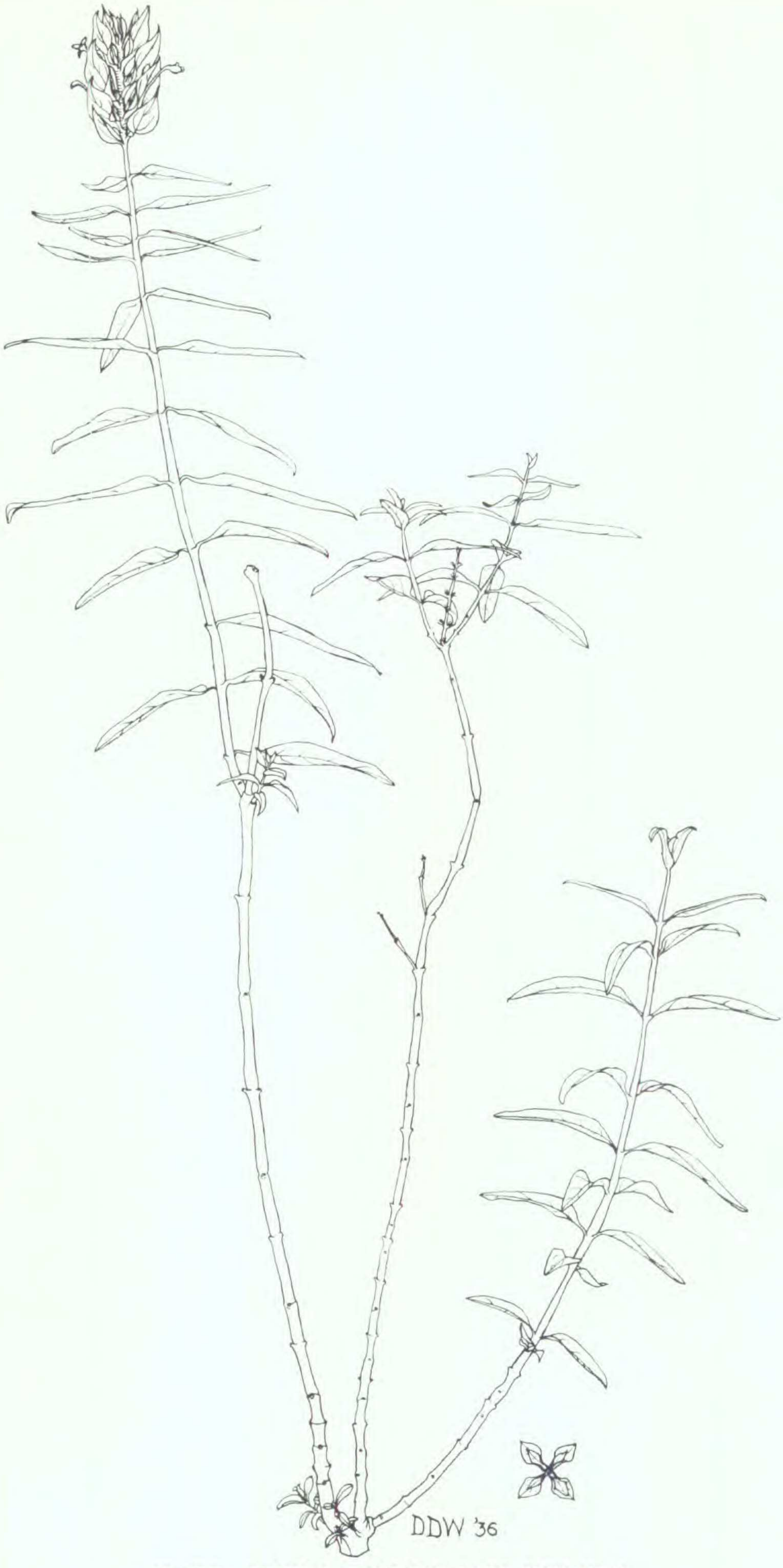


HAPP—TETRAMERIUM AND HENRYA

Explanation of Plate

PLATE 29

Habit and bracteal arrangement of *T. pla ystegium* Torr. Illustration made from living specimen grown at the Missouri Botanical Garden. × ½.

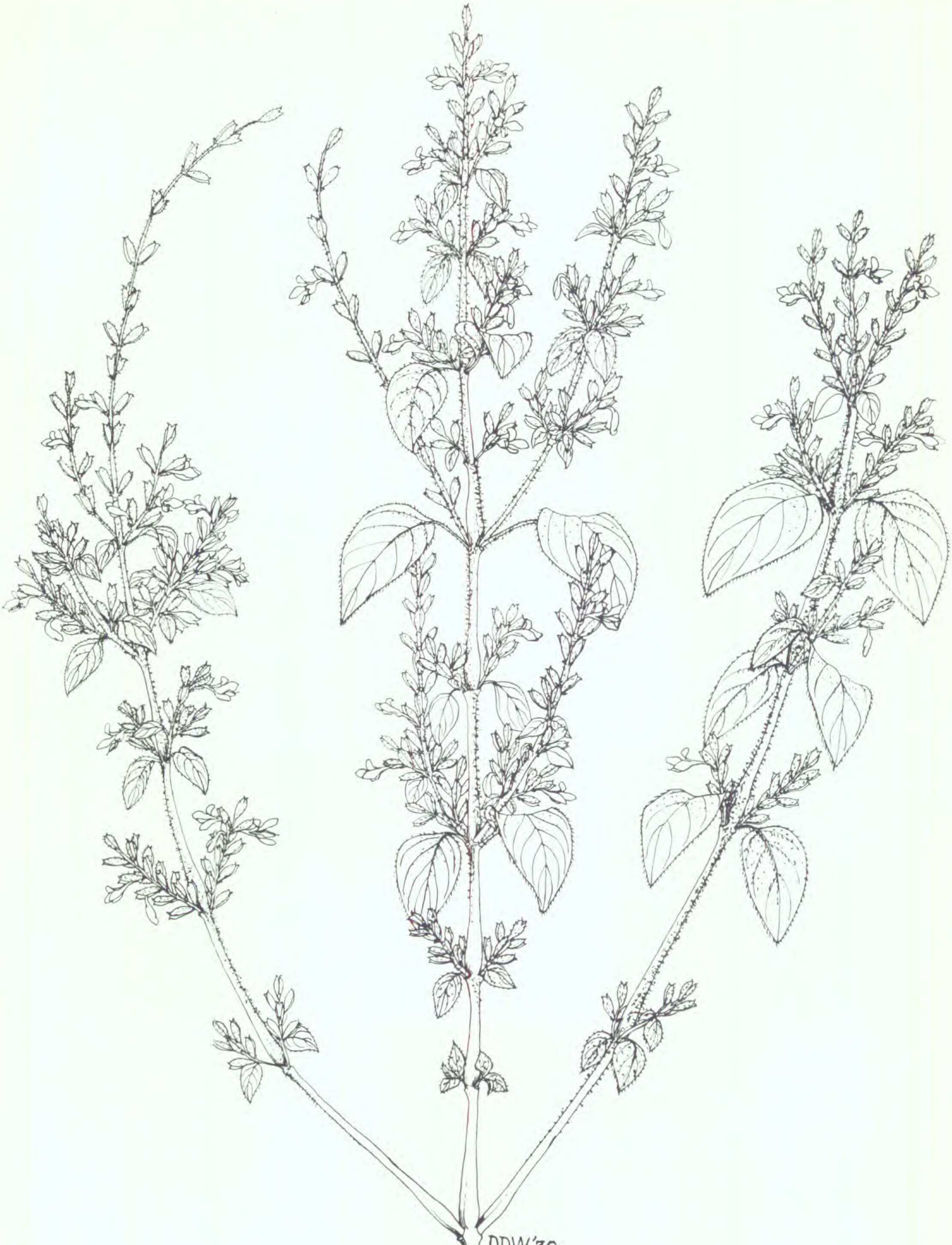


HAPP—TETRAMERIUM AND HENRYA

EXPLANATION OF PLATE

PLATE 3

Habit of *H. scorpioides* Nees. Illustration made from specimen, *Purpus 11155*, in Herbarium of the Missouri Botanical Garden. × ½.



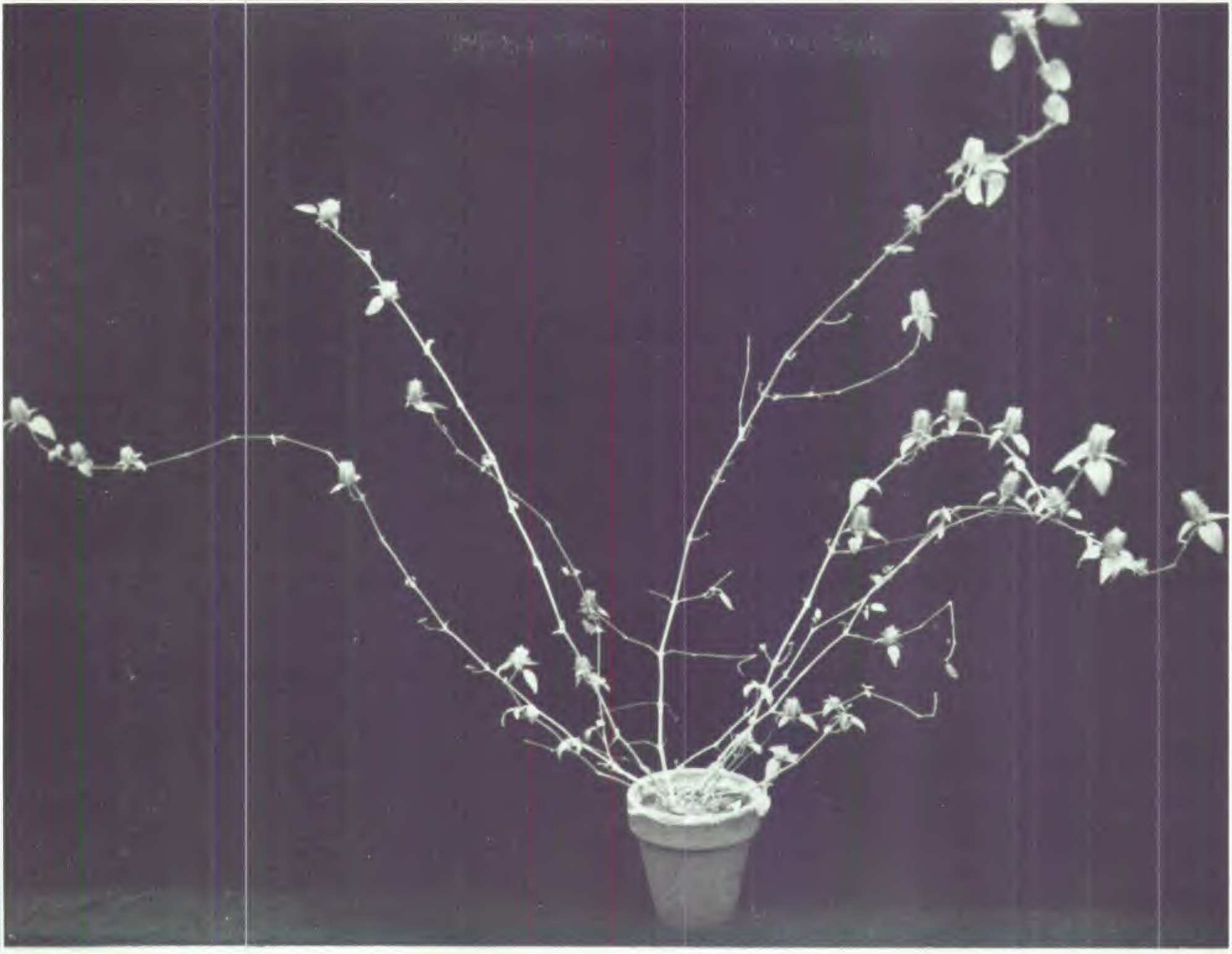
HAPP—TETRAMERIUM AND HENRYA

EXPLANATION OF PLATE

PLATE 31

Fig. 1. Habit of *T. nervosum* Nees. × 1/6.
Fig. 2. Habit of *T. nervosum* Nees. × 1/2.

Photographs made from living specimens grown at the Missouri Botanical Garden.



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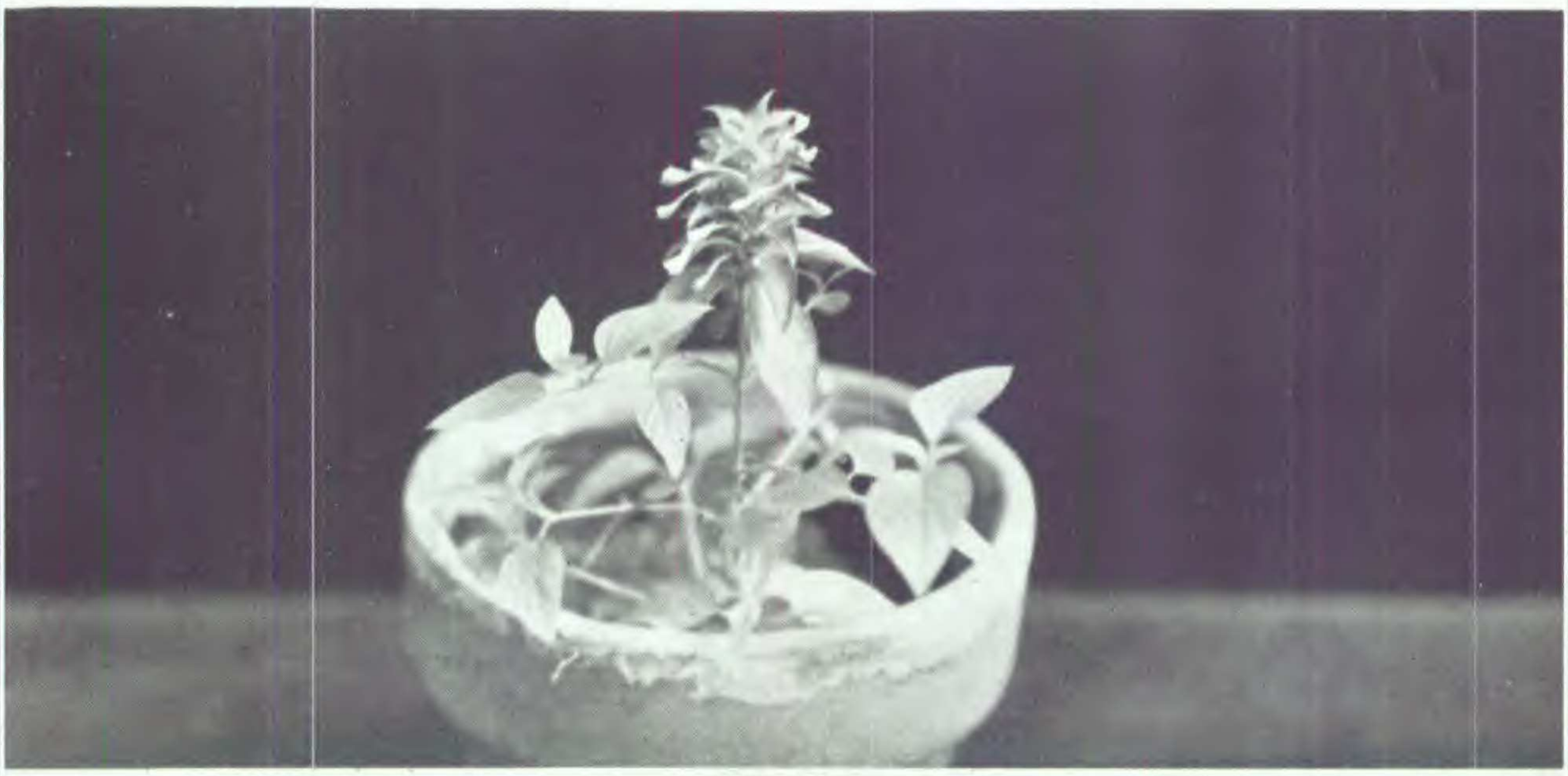


2

HAPP—TETRAMERIUM AND HENRYA

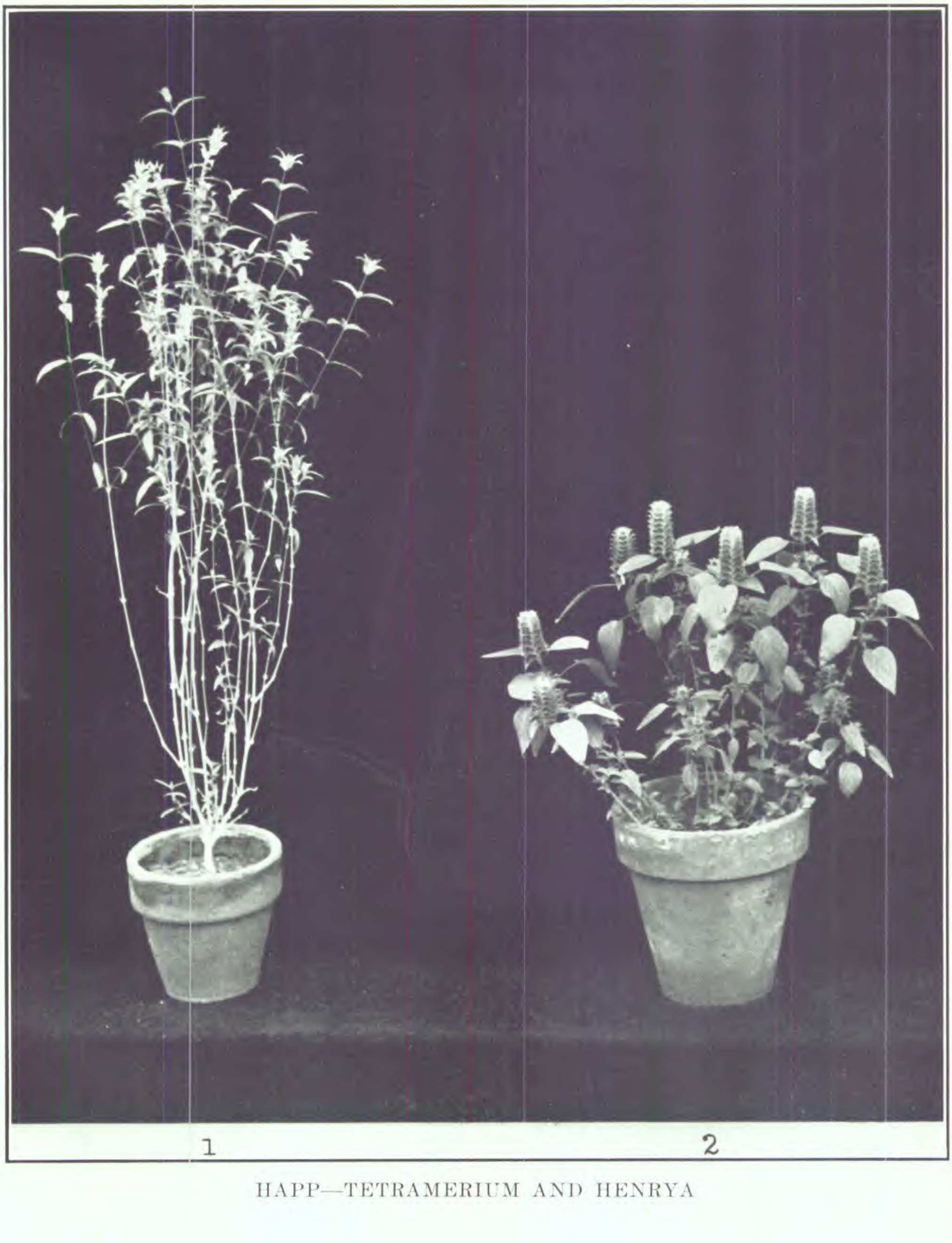
EXPLANATION OF PLATE

PLATE 32

Fig. 1. Habit of *T. hispidum* Nees.

Fig. 2. Habit of *T. nervosum* Nees.

Photographs made from living specimens grown at the Missouri Botanical Garden. × ⅓.



HAPP—TETRAMERIUM AND HENRYA

Explanation of Plate

PLATE 33

Fig. 1. Bract of *Tetramerium platystegium* Torr. × 1.2.
Fig. 2. Bract of *Tetramerium nervosum* Nees. × 1.2.
Fig. 3. Bract of *Tetramerium hispidum* Nees. × 1.2.
Fig. 4. Bract of *Tetramerium aureum* Rose. × 1.5.
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Fig. 6. Cauline bract of *Henrya insularis* Nees. × 3.
Fig. 7. Cauline bract *of Henrya scorpioides* Nees. × 3.
Fig. 8. Bracteole of *Tetramerium hispidum* Nees. × 3.
Fig. 9. Bracteole of *Tetramerium nervosum* Nees. × 3.
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Fig. 11. Involucral bract of *Henrya insularis* Nees. × 1.5.
Fig. 12. Involucral bract of *Henrya scorpioides* Nees. × 1.5.
Fig. 13. Involucral bract of *Henrya rupicola* Happ. × 1.5.
Fig. 14. Involucral bract of *Henrya Barclayana* Nees. × 1.3.
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Fig. 16. Perianth of *Tetramerium nervosum* Nees, laid open. × 3.5.
Fig. 17. Perianth of *Henrya scorpioides* Nees, laid open. × 2.5.
Fig. 18. Anther of *Tetramerium platystegium* Torr. × 25.
Fig. 19. Anther of *Tetramerium nervosum* Nees. × 25.
Fig. 20. Anther of *Henrya scorpioides* Nees. × 25.
Fig. 21. Pistil of *Tetramerium platystegium* Torr. × 25.
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Fig. 34. Pollen-grain of *Tetramerium nervosum* Nees. $28 \times 20\ \mu$.
Fig. 35. Pollen-grain of *Henrya scorpioides* Nees. $40 \times 20\ \mu$.